

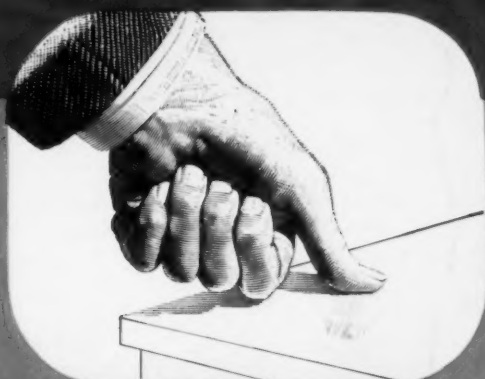
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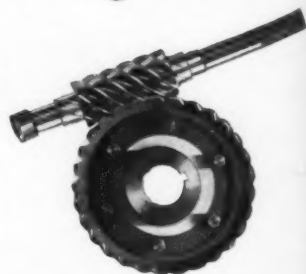
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Nameless Children

BRANDING cattle so as to indicate ownership is a well recognized and approved method of protecting property rights. The owner of a herd selects his brand which becomes, so to speak, his trade mark. Out in the big open spaces where men are men and cattle the principal product, any one who obliterates a brand is considered a criminal and treated accordingly. In the past, when crime was not as highly regarded or as softly treated as it is today, shooting or hanging were considered suitable punishments.

One can well understand that attitude on the part of the cattlemen. They risked their lives, not to speak of their money, faced the hazards and hardships incident to exposure to extremes of heat and cold and gave all that they had to building up their business of beef on the hoof. And all that they had to protect what they had so painfully built were their brands.

I presume that cattle rustlers may have had an organization or trade association and perhaps a lobbyist or two to protect their interests. If so, they may well have considered how beneficial it would be to them if a law could be passed making it illegal to brand cattle. They would hardly have the effrontery to ask that cattle stealing be eliminated from the criminal codes, but the elimination of brands would do just as well because it would completely abolish the identity of the product.

Under such circumstances it would be a simple matter for a strong arm man with political protection to take over in a matter of hours or days what had cost another man years or even a lifetime of honest work to build.

Silly even to think of such an absurd proposal, isn't it? Free men in a free country would not stand for anything like that. But that is exactly what an important and powerful group of economic reconstructors are proposing to do in connection with brands applied to products — not to cattle on the hoof, but to beef and other foods in the can, to stockings, to shoes and a multitude of other products.

The effect on property rights and the destruction of lifetimes of work of both men and money would be exactly the same as it would be in the case of the elimination of cattle brands. But beyond this, the effect on quality of product would be deplorable.

No manufacturer can afford to put a brand or a trade name on an inferior product. Anonymity is the only cloak under which the "just as good" product can be handled and sold. A brand name on a product is the best possible protection for the consumer because it automatically forces the maker of that product to maintain quality.

We have a word in this language, and it is not a pretty one, that we apply to nameless children. Do we want this same term applied to the products of America's farms and factories?

J. H. Van Deventer



How to Cut Replacement Costs and Send More Steel to War

Regular inspections, adequate painting, and frequent lubrication, will cut replacement costs and save steel that is vitally needed in every quarter of the globe by America and her Allies.

Initiate, today, a special wartime inspection service. Examine roofs, siding, and structural members of buildings—especially where atmospheric conditions, or process fumes, result in destructive corrosion. Clean and paint steel that shows signs of deterioration. Consult a reliable paint manufacturer if standard paints do not prove satisfactory.

Many types of manufacturing equipment—trucks, cranes, and the like—operate in and out of doors.

Such equipment should not only be painted, but moving parts should be adequately lubricated to save the steel that otherwise would be needed for replacement of parts.

The moving parts of all types of machinery should be regularly inspected to make certain that operators are applying lubricating oils and greases of the correct qualities, and in the right quantities. If undue wear of moving parts continues, ask a lubricant manufacturer for advice.

Take better care of the steel now serving you. Less steel used for replacement means more steel for the fighting fronts.



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News Front

Despite current surplus of both pig iron and scrap on the Pacific Coast, the Pacific Northwest again is putting on the heat for a blast furnace. The latest proposed location is Everett, Wash. Brassert has submitted a furnace design and plans are to ship the pig iron east. WPB again may be unable to withstand the terrific political pressure, just as in the case of the Texas facilities.

Captured German armor-piercing shot recently showed an alloy steel nose flash welded to a tough carbon steel body. American Ordnance officials have taken note.

New York gold jewelry manufacturers in the throes of severe curtailment are shifting their small Jelenco (dental inlay) centrifugal casting machines over to war production. Many brass, copper, aluminum, and even steel instrument and bombsight parts, and numerous other intricate small shapes are now being turned out. Far heavier orders are in prospect.

A promising tin mining scheme for South Dakota has been unable to secure Government money. So, with private backing, production will be initiated within two months.

Magnesium supply is a little easier, and the Signal Corps will soon advise considerable replacement of aluminum by magnesium in much aircraft and portable radio equipment.

Biggest problem for Ford Motor Co. posed by Edsel Ford's death is to find an equally sales and style conscious administrator. Ford top management, comprising candidates for the succession, is heavy on the manufacturing end; Edsel is credited with having kept a finger on the public pulse. The problem is so serious a poor solution may mean twilight of the company.

Current alloy steel consumption exceeds production by over 10 per cent in the Chicago and Detroit districts, and production exceeds consumption by about 15 per cent in the Pittsburgh district and 10 per cent in the Canton district. Approximately half of WPB's alloy expansion program has been in two plants, one in Chicago and one in Warren, Ohio.

Retribution: Only a year and a half ago the most popular marching song in Germany was, "Bomben uber London".

British estimate that post-war exports will have to exceed pre-war totals by 40 to 50 per cent, if pre-war standards of living are to be maintained and if the various plans for social security are to be more than idle dreams.

Reports on export of scrap are exaggerated. Mexico is getting a small amount (shredded tin cans that used to go to Japan) for copper precipitation plants along the border, Canada a little for steel making.

Vermiculite, used in a new process of porcelain enameling developed by a South African firm, gives a variety of pastel shades with a metallic finish.

Switchgear & Cowans, Ltd., England, recently offered to pay a workman \$2500 a year to keep away from the plant because he was a troublemaker. So far the courts haven't decided whether the offer can be accepted.

Magnesite Refractories

By J. H. CHESTERS

Central Research Department, United Steel Companies, Ltd., Stocksbridge, England

o o o

Previous articles by J. H. Chesters, on steel plant refractories, that have appeared in *The Iron Age* are:

"All-Basic Open Hearth Furnaces," Aug. 15 and 22, 1940.

"Steel Plant Refractories," Feb. 6 and 13, 1941.

"Basic Open Hearth Above Sill Plate Level," May 22 and 29, 1941.

"Basic Openhearth," Aug. 7, 14 and 21, 1941.

"Casting Pit Refractories," Nov. 20 and 27, 1941.

"Electric Steel Plant Refractories," March 5 and 12, 1942.

"Acid Open-Hearth Refractories," May 28 and June 4, 1942.

"Soaking Pit and Reheating Furnace Refractories," July 16 and 23, 1942.

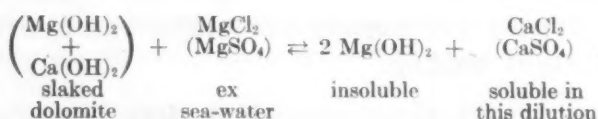
"Acid and Basic Bessemer Refractories," Nov. 5 and 12, 1942.

"Silica and Semi-Silica Refractories," Jan. 21 and 28, 1943.

THE peculiar distribution of magnesium minerals throughout the earth's crust and in particular the fact that two of the main sources, Austria and Manchuria, are under Axis control, make magnesite the most "political" of all refractories.

The problem thus presented to the United Nations has been answered in a way that until recently would have seemed quite fantastic. The magnesite has been extracted from sea water. Its presence as magnesium chloride and sulphate in concentration, second only to that of salt, had long been known, but it was only comparatively recently that it was shown, for example, by Marine Chemical Co. of California, that use could be made of the extremely low solubility of magnesium hydroxide to extract magnesite from sea water by a chemical precipitation process. The obvious method, concentration by evaporation and subsequent separation of magnesium salts, would normally be quite uneconomic due to the enormous amounts of fuel required. Where the salts occur naturally in greater concentration, as in magnesium-rich brines, or where solar evaporation is feasible, such methods might be economic, but in Great Britain the cost would be prohibitive. The other factor that has made the extraction of magnesite from sea water a practical proposition, is the discovery by Chesny that slaked dolomite could be used as the precipitating agent instead of slaked lime.

As the simple formula for this reaction shows:



the process performs the double feat of obtaining the magnesite simultaneously from the sea water and the dol-

omite. Much money and time have been spent in trying to extract magnesite from dolomite and it is indeed strange that the answer to the problem should come with the use of so cheap a raw material as sea-water.

It was thought at first that even if magnesite were obtainable in this way, it might lack the qualities necessary

for the manufacture of a good magnesite brick. Thus pure sand, though higher in refractoriness than the aver-

age silica brick, is a poor material from which to manufacture this refractory. Three days' work sufficed to show not only that the material could be readily dead-burned but that brick made from it were similar in properties to Austrian magnesite brick, and possessed in addition one remarkable advantage, namely a high thermal shock resistance.

Magnesium hydroxide, known mineralogically as brucite, is also obtained in considerable quantities from the earth. Thus in Canada (Ontario and Quebec) useful deposits have been found which on concentration provide an economic source of magnesite, while considerable supplies are also being obtained from Nevada. These sources together with the available carbonate rocks of India, and of the State of Washington, provide Great Britain and America with the magnesite required for the manufacture of magnesite and chrome magnesite brick.

Magnesia

Although quite complex in its behavior as a refractory, magnesite is fundamentally the simplest of all the materials used in furnace construction. Fig. 1 shows a large crystal of magnesite over one inch in length and perfectly transparent, which was accidentally produced by the Norton Co. as a result of prolonged heating in an electric furnace. Its perfection is such that it might be taken for a glass model, were it not for the obvious cubic cleavage on some of the faces. Apart from slight flaws it can be considered as a single crystal and indeed as a multiplication of the simple lattice structure shown in Fig. 2. This structure is similar to that of common salt (NaCl) except that the "black" atoms, instead of being sodium, are magnesium, while the "white" atoms, instead of being chlorine, are oxygen. The charge on these atoms (or ions) is double that of the ions in sodium chloride and the electrical forces holding the structure together are therefore much greater. This shows

Continuing his series on steel plant refractories the author investigates, in the first of two articles, sources of refractory magnesite, properties and the influence on these properties of firing treatment. Binary and ternary magnesia systems are also discussed and their behavior considered.

itself in the high refractoriness, melting only occurring when the thermal vibrations are sufficient to carry the atoms beyond the control of these forces. The actual length of the unit cubic edge is 4.20 Å units. This is the only form of magnesia, though it can and does, of course, vary considerably in crystal size. The idea that magnesia exists in two forms, alpha and beta (comparable with the silica modifications) is no longer held, it having been proved beyond doubt that the only fundamental change which occurs during the firing of magnesia is the growth of the crystals; the Debye Scherrer patterns are identical for the material produced by calcination of magnesite at say 1830 deg. F., and the electrically fused product. The fundamental structure is of immediate practical interest because it enables an estimate to be made of the specific gravity of pure crystalline magnesia.

The density of a perfect crystal of magnesia can be calculated from the formula:

$$\rho = \frac{4M}{d^3N}$$

where ρ is the density, M the molecular weight of magnesia and N Avogadro's number. If the value 4.20 is assumed for the lattice edge then the calculated density is found to be 3.59. This is considerably lower than the usually quoted value of 3.65 first given by Moissan, which is doubtless due to the effect of impurities in their samples together with the difficulty experienced in making an accurate determination of the specific gravity of magnesia. The use of water as the displacement liquid is open to the objection that hydration may occur while if organic liquids are used their expansion with temperature increase is so great that even bigger errors may result.

A determination made by the author on the single crystal shown in Fig. 1 gave the value of 3.583. Since Aus-

trian magnesite containing some 8 per cent of iron gives a value of about 3.65, and since an addition of iron oxide is found to raise the specific gravity by about 0.01 for each 1 per cent addition, it is probable that the value of 3.58 is close to the true value for a perfect crystal.

MgO-SiO₂

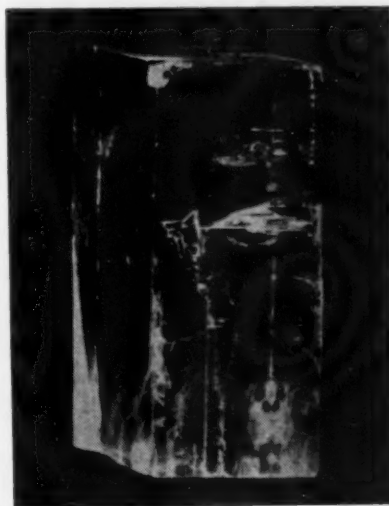
Of the binary systems so far worked out MgO-SiO₂ is perhaps the most important in connection with magnesia. It does, unfortunately, contain a eutectic (Fig. 3) at approximately 65 per cent silica, 35 per cent magnesia, which melts at only 2820 deg. F. The most useful compound in the series is forsterite (2MgO.SiO₂) which has a melting point of 3470 deg. F. This is not only used as a refractory but also occurs, mixed with magnesia, in high silica magnesite brick such as are made from the Norwegian raw material.

CaO-MgO-Al₂O₃

Refractories containing the oxides

o o o

FIG. 1—Magnesia crystal formed by prolonged heating at high temperatures.



CaO-MgO-Al₂O₃ and no silica, are rarely found, but the system is of interest in that it has been found possible to employ the eutectic, which contains approximately equal amounts of lime and alumina and only about 5 per cent of magnesia, as a low melting point slag. In contact with the magnesite lining of an induction furnace this slag does comparatively little damage as only small amounts of magnesia pick-up cause it to freeze. Thus with about 15 per cent MgO the melting point is already over 2912 deg. F.

MgO-FeO-Fe₂O₃

The addition of iron oxide to magnesia has long been used as a method of promoting sintering and recrystallization, while this reaction occurs naturally whenever the Breunnerite type of magnesite is fired. The main points of interest are that considerable amounts of iron oxide can be added to magnesia without any serious drop in refractoriness, the nature of the reaction product depending on the atmosphere of the furnace. Thus, if the atmosphere is strongly reducing, the iron remains in solid solution as FeO, whereas if it is oxidizing, magnesio-ferrite (MgO.Fe₂O₃) tends to crystallize on cooling. The field including these reactions has been very ably studied by Fisk and McCaughey in their Ohio State University publication.

MgO-CaO-SiO₂

This system is the basis of commercial dolomite brick production and as such will be discussed in a later section. In relation to magnesite it shows that such minerals as dicalcium silicate (2CaO.SiO₂) and Wollastonite (CaO.SiO₂) may be expected in magnesite brick or clinker containing lime and silica. With certain magnesites, in particular the Canadian, this represents a serious problem since β dicalcium silicate tends to invert on cooling below 1247 deg. F. to α dicalcium silicate with a 10 per cent volume expansion. The dusting which is associated with this change can be overcome by the use of stabilizers such as

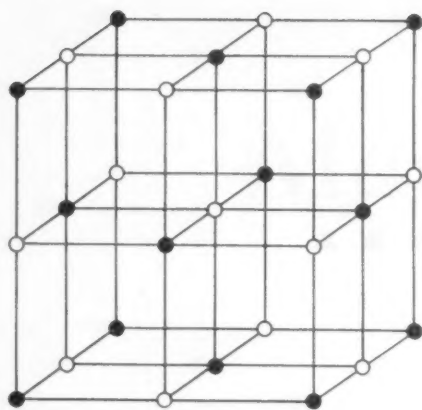
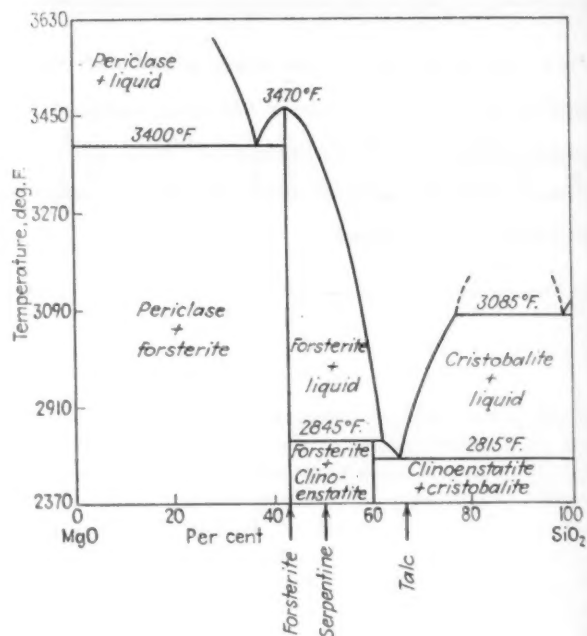


FIG. 2—Atomic structure of magnesia, showing simple cubic arrangement of the magnesium (black) and oxygen (white) atoms.

RIGHT
FIG. 3—Behavior under heat of the MgO-SiO₂ system. (Shown in deg. F.)



borates or phosphates and must always be guarded against where such compositions are involved.

MgO-Al₂O₃-SiO₂

Alumina and silica frequently occur in appreciable amounts in magnesite and in at least one refractory brick the alumina or clay addition is made intentionally with a view to developing spalling resistance. The point to be noted is that the eutectic in this system has a very low melting point, namely 2453 deg. F. Its composition, however, is MgO 20.3 per cent, Al₂O₃ 18.3 per cent, Mg₂ 61.4 per cent and hence it would not be expected as a dominant phase in a magnesite-rich material that had attained equilibrium.

MgO-FeO-SiO₂

All the above mentioned systems may be conveniently referred to in the October, 1933, issue of the *Journal* of the American Ceramic Society. The

present system is dealt with in the April, 1938, issue. It can be seen from this diagram that whereas FeO and SiO₂ form very low melting point mixtures (2151 deg. F.) the addition of only about 20 per cent magnesia brings the melting point above 2912 deg. F.

The real need is for the working out of the system MgO-CaO-Al₂O₃-Fe₂O₃-SiO₂. Those who have attempted even a preliminary evaluation of a ternary system know how much more difficult this is than a binary system due to the large number of mixtures that must be studied and the complexity of the relationships. With a quaternary system the additional difficulty of representing the data arises since solid models must be used. This being so, nothing short of a refractory Einstein would be required to picture the reactions involved in a quaternary system such as that mentioned above. Nevertheless, even cone melting points on this system, and some

data regarding the phases which appear, would be of help to the magnesite worker, as has become most evident in connection with the work on sea water magnesia. The recent paper by Birch on equilibrium diagrams as applied to refractory materials will be of interest to the reader who wishes to pursue further this aspect of the problem.

Raw Materials

The main sources of raw material have already been mentioned. It is perhaps useful to divide them more clearly. They fall roughly into five main groups: Spathic, that is, coarsely crystalline magnesite (MgCO₃); crypto-crystalline (sub-microscopic) or "compact" magnesite (MgCO₃); breunnerite, which is a solid solution of magnesium and ferrous carbonates (MgCO₃-FeCO₃); brucite (Mg(OH)₂); sea water magnesia.

The original developments were mainly in the Veitsch district of Styria (Austria) where in 1880 dead-burned magnesia was produced from the breunnerite type of rock. When the first World War started this was the only magnesite used in considerable quantities for the production of brick. During that war the compact Greek material and the high lime Canadian magnesite were developed on a commercial scale and more recently large quantities of magnesite have been mined in Russia and Manchuria. Considerable developments also occurred during the last war in the production of dead-burned magnesite from the Washington material. These various sources, together with brucite and sea water magnesia, form

TABLE I

Influence of Firing Treatment on the Specific Gravity, Crystal Size and Hydration Tendency of Indian Magnesite

Treatment, Deg. F.	Specific Gravity	Crystal Size, Diameter, mms.	Hydration Tendency—5 Hr. in Steam—Loss on Ignition, Per Cent
Fired to 2370.....	3.494	0.01—0.03	8.91
Fired to 2540.....	3.496	0.01—0.02	7.36
Fired to 2730.....	3.539	0.02—0.03	1.92
Fired to 2910.....	3.544	0.03—0.04	1.13
Fired to 3000.....	3.551	0.04—0.05	1.06
Held ½ hr. at 3000.....	3.565	0.04—0.05	1.04

with Indian magnesite the principal materials in use today. The following table gives a picture of the output, in tons, in 1936 (Canadian figure is for 1935, Russian for 1934):

Australia	17,888
Austria	397,776
Canada	27,129
Manchuria	206,000
Czechoslovakia	83,270
Greece	116,106
India	15,716
Russia	482,000
United States	187,894
Yugoslavia	39,008

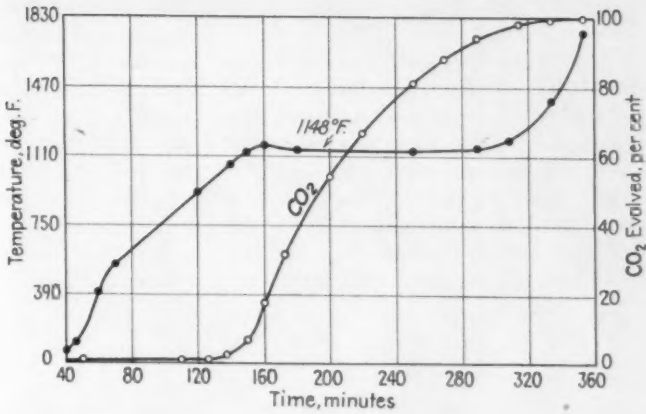
Dead-Burned Magnesite

By "dead-burned" is meant a magnesite that has been calcined at such a temperature as to enable it to be used in subsequent brick-making and service without undue difficulty due to hydration or shrinkage. Whether the material is made from the carbonate or the hydroxide the same general considerations apply, though the precise reactions are of course different. The dissociation of magnesium carbonate has been studied by many workers, even before the close of the last century. It has been studied again quite recently by Conley in connection with calcination conditions for limestone, dolomite and magnesite. Conley has shown that the dissociation is very rapid at about 1110 deg. F. (Fig. 4). This conclusion was also reached by the author, who showed that the breakdown temperature of the carbonate is considerably higher than that of the hydroxide, while the basic carbonates dissociate over a long and intermediate temperature range. The main point of interest to the steel plant operator is the effect of the calcination temperature and the fluxes present on the rate of crystal growth and the stability of the final product. The data summarized in Table I and Fig. 5 give an example of the kind of result obtained. These tests were made on a sample of lightly calcined Indian magnesite having the following analysis:

SiO ₂	5.36 per cent
Fe ₂ O ₃	0.68 per cent
Al ₂ O ₃	0.40 per cent
CaO	2.58 per cent
MgO	90.82 per cent

The material was ground to pass a 72 mesh sieve, moulded into pills and fired in a laboratory gas fired kiln. Above 1830 deg. F. the heating rate was kept steady at 390 deg. per hour up to 3000 deg., this being the order

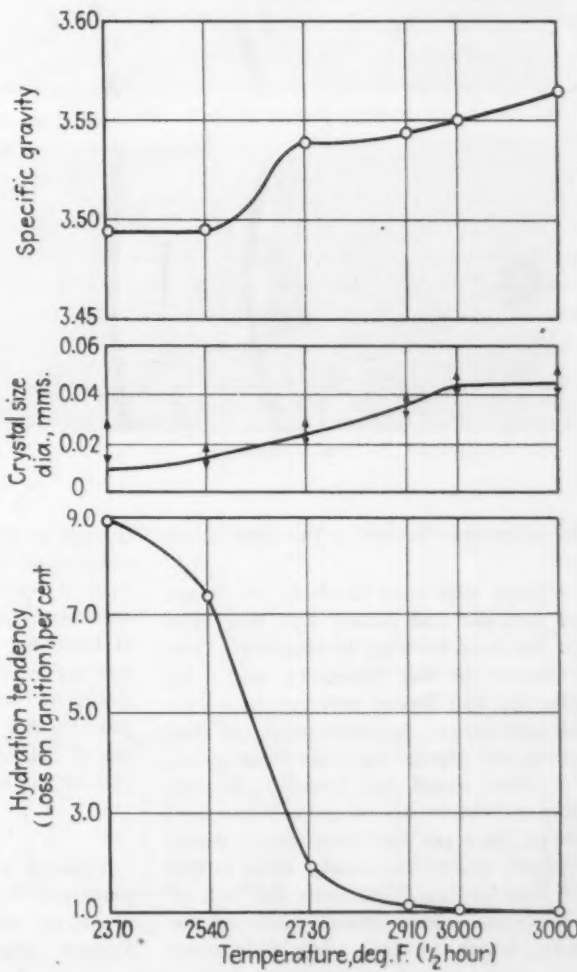
FIG. 4 — Dissociation of magnesium carbonate (after Conley).



of heat treatment received in a rotary kiln. Samples were withdrawn every half hour and specific gravity tests made. It will be seen from the figure that above 2540 deg. F. the specific gravity began to rise quite rapidly, reaching a maximum value of 3.56 at 3000 deg. The crystal size, as determined by the X-ray monochromatic pinhole method, rose from 0.01 mm. to 0.05 mm. The change in crystal size is clearly shown by the X-ray photographs (Figs. 6a, 6b and 6c). The hydration tendency, which was

determined by maintaining a small sample in contact with steam for 5 hr. also fell off rapidly with increased firing temperature, being less than one quarter at 2730 deg. F. of the value obtained for the 2370 deg. sample. These conclusions illustrate the general problem which is analogous for all the materials involved. On firing the magnesia crystals grow; the amount of surface exposed is reduced, and there is a drop in the hydration tendency. The material shrinks as the minute pores in the

FIG. 5 — Effect of firing treatment on the specific gravity, crystal size and hydration tendency of Indian magnesite.



magnesia disappear and the specific gravity increases.

A great deal of work has been done on the effect of various fluxes on the rate at which these changes occur and numerous patents have been taken out to cover the materials stated. Thus in the Alterra process calcium ferrites are added to pure magnesite of the compact type to increase the rate of dead-burning and thus reduce the risk

fuel, is 9 ft., the fuel consumption being approximately 895 lb. per ton of product. The material is fed in as lumps of about 1 in. size and is calcined at a temperature between 3000 and 3180 deg. F. The advantage of the rotary kiln over the earlier periodic shaft kiln type is, of course, the uniformity of the firing treatment.

Mention should also be made of electrically fused magnesia which al-

cent iron oxide and the Radenthein and Trieben about 4 per cent iron oxide. The silica content varies from 2 to 4 per cent and the alumina is generally about 1 to 2 per cent. The lime is usually less than 3 per cent. This analysis is not obtained automatically, but results from careful sorting of the raw materials and even magnetic separation of the fired product.

The Greek magnesite is much purer, the magnesia usually exceeding 90 per cent. Most of it comes from deposits in the island of Euboea, though considerable amounts also occur on the mainland and in the island of Mytileno. It is a difficult material to dead-burn though complete success has been achieved by the Anglo-Greek Magnesite Co. (Fig. 7). The difficulty lies in the fact that a high temperature is required and that in the shaft kilns used it is possible for caustic material to exist side by side with well dead-burned magnesite. Attempts to add suitable mineralizers in shaft kilns have not been successful and consequently very careful supervision and sorting of the product is required to insure that it is up to standard.

The Russian magnesite is fairly similar in composition to the Austrian, but tends to be lower in iron oxide. The main difficulty with its use is the presence in the clinker of a considerable amount of free lime. This may occur as discrete particles of appreciable size which hydrate during the drying of the brick and cause serious cracking. A great deal of work has been done in Russia on the pre-treatment of the clinker, to eliminate the more active lime and magnesia. One method that has been used is the autoclaving of the magnesite using a plant similar to that employed in the production of sand-lime brick. The advantage of this method is its rapidity and the consequent large tonnages that can be handled by a comparatively small plant. Provided some such souring treatment is carried out, no serious difficulty need occur during brickmaking.

Manchurian magnesite was extensively used both in Great Britain and in America prior to the war and offers no particular problem as a brickmaking material. The Canadian magnesite is generally high in lime, a figure of 18 to 20 per cent being typical. Stability is achieved by the addition of iron oxide in the rotary kiln, the amount of iron present generally being about 8 per cent. With all these fluxes present the material can scarcely be considered as straight mag-

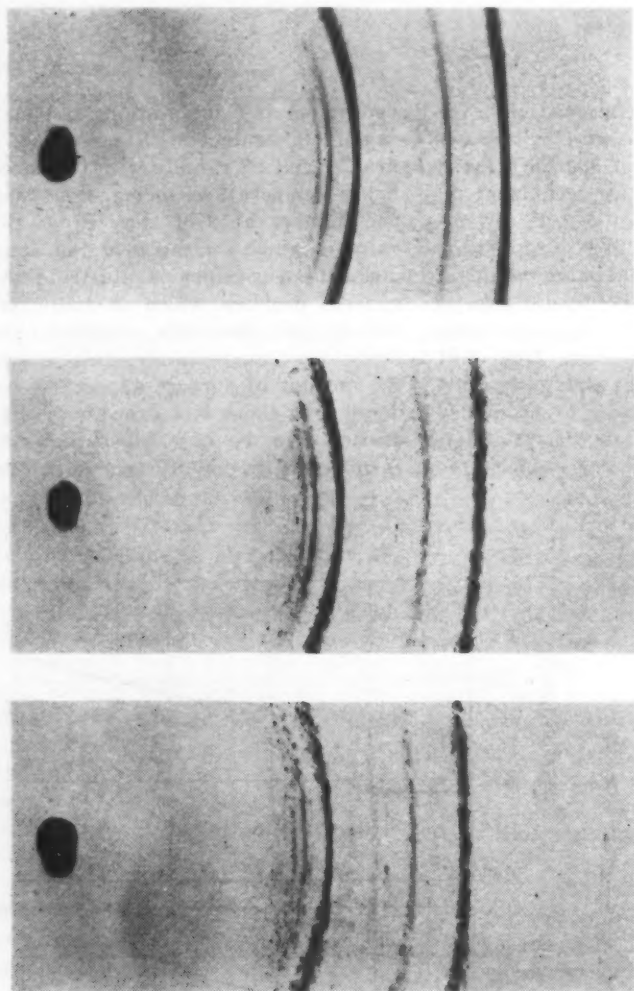


FIG. 6—X-ray back reflection photographs of Indian magnesite after firing to (top) 2370 deg. F., (middle) 2910 deg. F., and (bottom) 3000 deg. F.

of after-contraction in the final product.

Those who wish to study the types of periodic and rotary kiln employed in the dead-burning of magnesite, are referred to the excellent books by Comber and Banco referred to in the bibliography. A description of the Austrian plants has also been given in some detail by Endell. At the Radenthein works where a Breunnerite of the 4 per cent iron type is dead-burned, one of the rotary kilns is 328 ft. long and produces some 200 ton. of magnesite a day. The diameter of the kiln, which is fired with pulverized

though at present is only a small proportion of the total, will doubtless be used in increasing amounts as the demands on furnace structures increase. It has been found to give quite satisfactory results in ports and in other positions where the conditions are particularly severe and the extended use of this material is mainly a question of the cost of electrical power.

Properties

Typical chemical analyses of the principal brands of magnesite are given in Table II. In general the Veitsch magnesite runs about 8 per

nesite. Nevertheless, it has found many useful applications, both in brickmaking (magnesite and chrome magnesite) and in the production of a variety of stabilized clinkers and cements such as are manufactured by Canadian Refractories, Ltd.

Washington magnesite is also quite pure, but behaves rather differently in brickmaking than Austrian magnesite, due to its relatively low content of iron oxide. It is extensively used in the United States, both in brick form and as a clinker for open hearth furnace bottoms. Sea water magnesia, a typical analysis of which is given in Table II, varies considerably in composition according to how the process is worked. Thus for pharmaceutical purposes an extremely pure product is obtained, but for refractory work a content of about 88 per cent of magnesia is normal. Silica, iron oxide and alumina, are all present to the extent of about 2 per cent, while the lime content varies from about 3 to 6 per cent. It is generally considered that this should be as low as possible but a value of 3 per cent can be achieved only by the utmost control over the raw materials and process employed.

Attempts have been made in the past to assess the value of a magnesite clinker from a single test. Experience gained during the last few years shows how exceedingly dangerous such a procedure can be. It is now considered that at least five tests should be made, namely, chemical analysis, specific gravity, crystal size, hydration tendency and firing shrinkage. Specific gravity affords a rough index of the degree of dead-burning, but must always be considered in relation to the chemical analysis. Thus the Radenthein magnesite, which contains 4 per cent of iron oxide, generally has a specific gravity of 3.56,

FIG. 7 — Grecian dead-burned magnesite showing characteristic fibrous structure.



while that of Veitsch which contains 8 per cent of iron oxide, may be as high as 3.65. For the very pure Greek material a value of 3.50 may be considered quite good. Roughly the specific gravity figures may be corrected to the extent of 0.01 for every 1 per cent of iron oxide, though this is only a very rough approximation as it takes no account of the other impurities, for example, silica. The crystal size supplies confirmatory evidence of the degree to which the material is dead-burned—well burned material being 0.03 mm. or over—but from the brickmaking standpoint the two important characteristics are the hydration tendency and the firing shrinkage. If the hydration tendency exceeds the safe value or if the material contains a small amount of highly reactive material, then trouble may be anticipated in drying the brick. In view of this latter qualification the hydration figure alone may be mis-

leading, and it may be necessary to pick out discrete particles of material for separate test. Firing shrinkage tests are again only comparative but if the firing shrinkage of a new material is considerably greater than that of the normal, cracking is liable to occur in the kiln and the brick, if made in the standard molds, are likely to be undersize.

The ease with which magnesite sinters is also a factor of some importance, particularly in connection with monolithic hearths. Summing up, it may be stated that the finer the grind and the less pure the material, the more easily will sintering occur. Needless to say, both increase in temperature and time of soak also increase the amount of sintering which occurs.

Editor's Note: Next week the author concludes this study with a discussion of the manufacture, properties, specifications and applications of magnesite brick.

TABLE II
Selected Analyses of Dead-Burned Magnesite, Per Cent

Source	Austria		Greece		Manchuria	India	Canada	United States	
	Veitsch	Radenthein	Euboea	Russia				Washington	Sea Water Magnesia
Silica	1.7	2.1	2.6	4.7	2.8	5.4	7.9	3.2	2.5
Alumina	0.9	2.4	0.4	1.1	2.3	0.4	0.2	3.2	1.5
Ferric Oxide	8.2	3.9	0.5	2.7	1.9	0.7	7.8		2.4
Lime	2.5	2.3	2.0	5.7	1.8	2.6	19.5	2.0	5.0
Magnesia	86.9	89.0	95.3	85.2	90.8	90.8	64.5	91.6	87.6

*Analysis by J. Lumaden (Imperial institute)

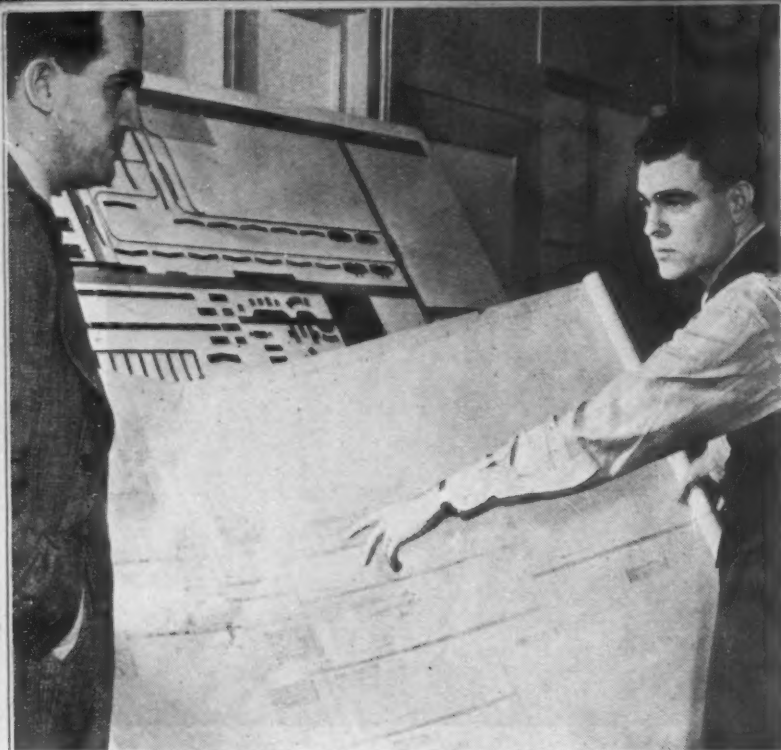


FIG. 1—Nelson Metcalf (left), head of Vultee's methods and controls department, and the author at chart followed in setting up new high speed production method for wing center section assembly. The chart is similar to the master process flow chart shown in Fig. 3. Layout board is at rear. Overhead conveyors are represented with worsted yarn strung between pins extending out of the board in.

VULTEE Field Division of Consolidated-Vultee Aircraft Corp., the world's number one producer of basic training airplanes, has achieved many "firsts" in aircraft production. Awarded an army contract for trainers three years ago as a result of competitive design competition, Vultee production men began then to apply techniques entirely new to aircraft manufacture. The first published evidence of this transition in methods came in the spring of 1941, when the first powered aircraft assembly line went into operation at Vultee Field. That line has never stopped.

As a result, today the "B. T.'s" from this assembly line are numbered in thousands rather than hundreds, and provide the basic training for virtually every new pilot in America's Army Air Forces.

The assembly line delivers the finished product, and provides the dramatic side of mass production that is appreciated by the outside world. But production men know that the real drama takes place behind the scenes. Feeding a moving line which consumes thousands of detail parts each hour, presents a tremendous production control problem.

The smooth control of production here is accomplished not by complicated systems and paperwork, but by a preplanned and engineered scheme of manufacture. Into this scheme are integrated the essentials of mass production. Paramount among these essentials is the function of plant layout.

Plant layout at this plant is an industrial engineering function, and for this reason exercises unusually broad jurisdiction. The plant layout engineer heads a section of methods and controls, the management department which centralizes all industrial engineering work at Vultee. As a part of this department, the layout engineer has available all time study and planning data for every project, and employs the services of methods of engineering personnel to whatever extent required. Every layout, whether it entails setting up a line for a new contract or rearranging a department to meet changing conditions, is handled as a project. There is no indiscriminate moving of equipment at the whim of interested individuals. Practically all changes in existing layout are the result of cost reduction surveys made jointly by factory supervision and methods engineering.

Plant Layout

By **C. HARPER BRUBAKER**

Methods & Controls Department, Vultee Aircraft Inc., Vultee Field Division

The procedure followed in making such a move can be best illustrated by a specific example now in progress. This project is a complete revision of the wing center section department layout. The objectives in this case were fourfold: To provide more mechanical handling and permit women to replace men, to shorten the subassembly work cycle to cope with material scarcity problems, to accommodate a new engineering design, and to incorporate substantial methods improvements for saving manpower. Let us follow this project:

The first step was to send methods and time study engineers into the department for several weeks in order to analyze and time study the assembly of the center section in its entirety. Not only did the study cover the assembly of the center section, but each of the many subassemblies involved.

During the time that the time study men were doing their job, material handling engineers were studying every part of the unit determining the best method of transporting the various subassemblies, major assemblies, and the complete center section through their various stages of assembly. Conveyor lines of several types were finally agreed upon as applicable to most of the handling.

Process Charts Prepared

Following the complete time study analysis, process charts of various types were prepared. Among these was a chart showing the process time of the present method of assembly, and another chart showing the process time of the proposed

For Aircraft Mass Production

method of assembly. It is interesting to note that the process time of the new layout is to be only one-third of the present method.

The reduction of process time is ever foremost in the layout engineer's mind, and is the basic reason why a complete schedule is set up for each major unit of the center section as well as every subassembly, so that valuable time is not lost in material and assemblies sitting in accumulation areas waiting for an unscheduled operation.

To accomplish this objective, the layout engineers, before attempting to make a scale model layout, first developed a complete schedule for each of the many assemblies. This schedule, part of which is shown in the picture, shows the time when each detail part, subassembly and major assembly must be started, the length of time allowed for process, and at what hour it must be ready to meet

. . . At Vultee, complete process flow charts are worked out in detail to assure the right amount of time and space for manufacturing parts and for subassembly banks to feed overhead conveyor lines. An example is worked out on a new line for wing center sections.

another unit at a given point for further operation.

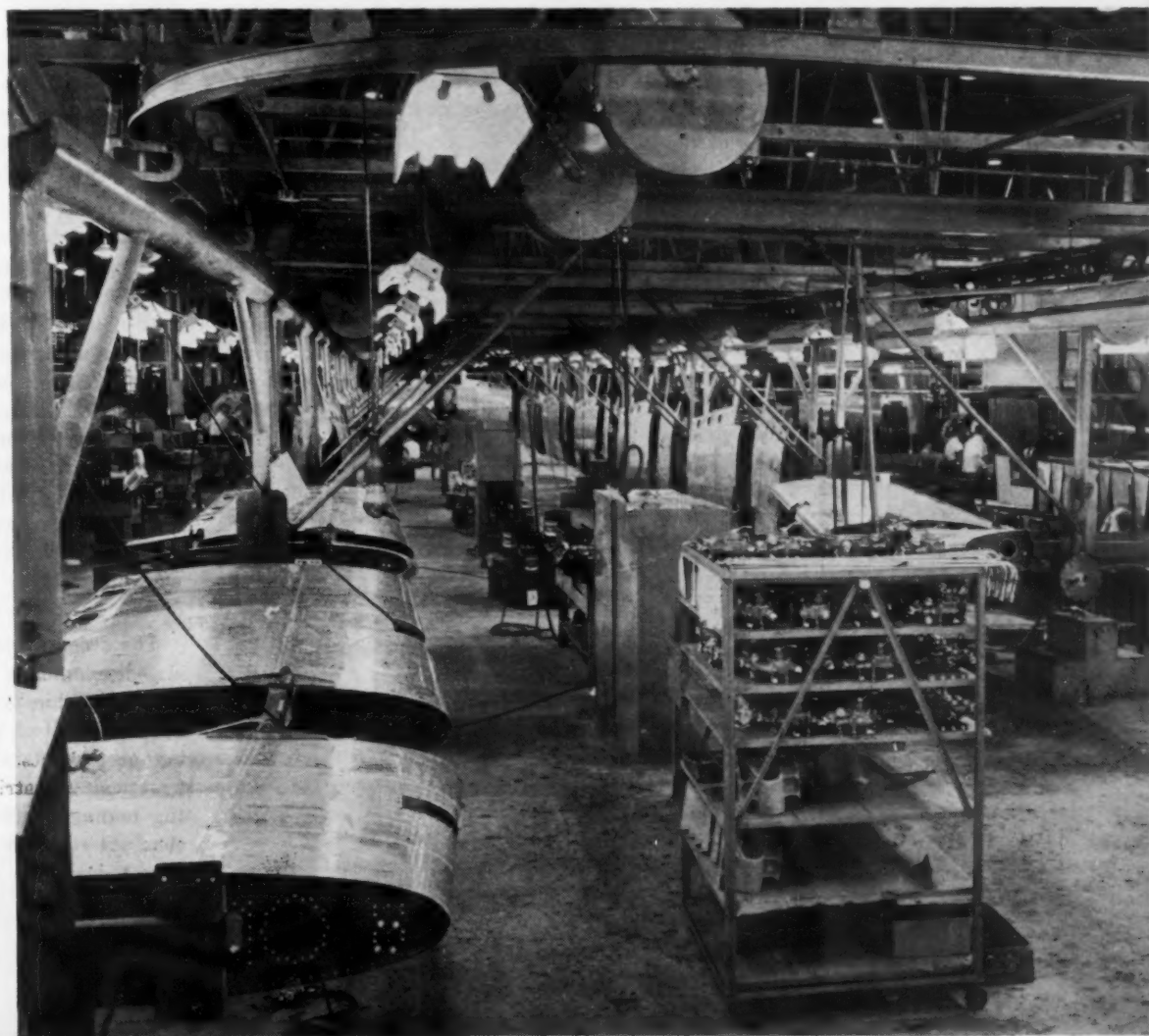
The time studies taken are used to balance completely every operation and station. Therefore, when completed, this master chart represents length of process time, sequence of operations, number of stations required, and the number of men required for each operation and station. It also is the basis for the schedule from which each subassembly and detailed part is manufactured.

With this information worked out for the peak schedule expected the plant layout engineer has little to

take for granted, but rather has complete factual data from which to start the actual layout.

The making of the layout itself follows the conventional method. Templates of all equipment are placed on the layout board and moved into various arrangements in accordance with the master process chart. With the making of this scale model of the complete department, the material handling methods which have been determined by thorough study, are worked out with the arrangement of each piece of equipment. A great deal of consideration is given to the hand-

FIG. 2—Wing center sections on the conveyor line. The actual layout for this section of the plant was done in the conventional manner with scaled paper cutouts. (See Fig. 1).



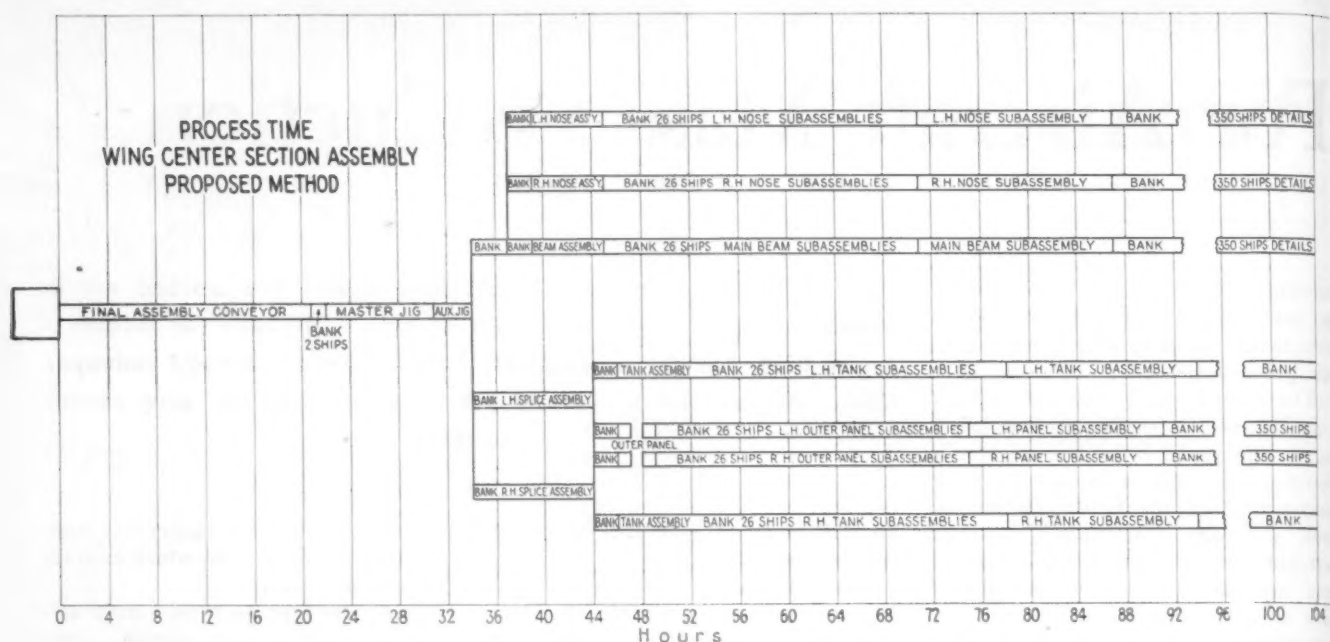
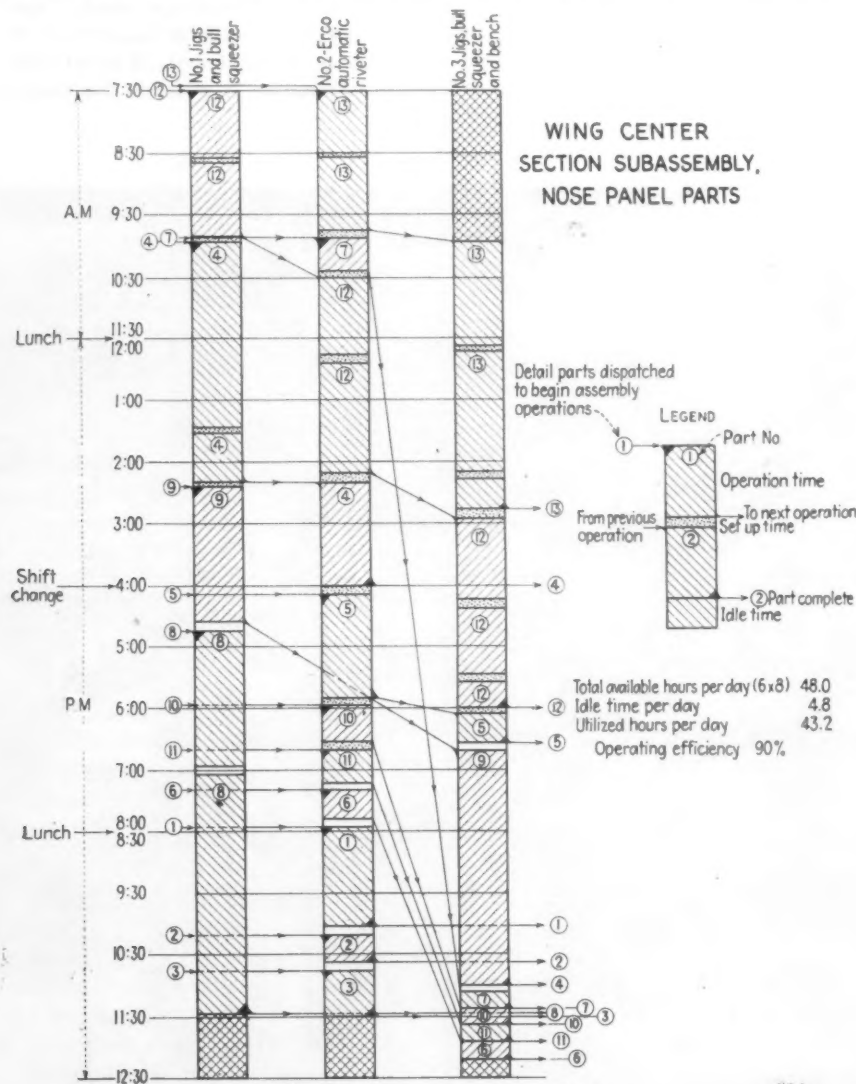


FIG. 3—Master process flow chart for wing center section subassembly. This is purely diagrammatic and represents the time interval for subassembly as related to final assembly and indicates banks of parts or subassemblies in terms of hours required to fabricate them.

FIG. 4—Breakdown of specific operations at three work stations for making nose panel parts for the subassembly of the wing center section. A graphical analysis of this kind is made for every unit shown on the master process flow chart, Fig. 3. In this way.



ling since it is felt a layout is right only when material handling is at an absolute minimum.

The working out of the entire project is done carefully and in cooperation with the foreman whose department is involved. This is done so that when completed the layout will have complete support of the man who has to live with it and make it work. When completed, the layout is presented to management with complete costs, cost reductions, and other items of expected accomplishment.

A layout such as this, built from factual data, and accompanied by charts and figures showing the resultant cost reductions, needs little additional selling to management.

After approval, drawings are made from the layout board. These are sent to the plant engineering department, which carries out all further details necessary to executing the work. The responsibility of the plant layout engineer, however, does not cease until the new arrangement is in and working, and he follows every phase of the job from a control standpoint.

The straightforward plan of analysis, development and execution illustrated in this typical case, has been applied to all of Vultee's Field's plant layout projects. It is an example of practical industrial engineering serving management in a way that is of concrete value in solving today's problems today.

Uses of

Rolled Zinc

and Zinc Alloys

THE confusion which used to exist owing to the excessive number of zinc alloys has now been dispelled because materials have, to a large degree, been standardized. Rolling problems have thereby been considerably simplified and today it is possible to order sheet or strip of a standard quality from a larger number of plants than previously.

When examining the possibilities of sheet and continuous strip rolled from zinc and zinc alloys the different methods of rolling should be considered separately, that is, pack-rolled sheets, singly-rolled sheets and continuous strip (always singly rolled). With ordinary pack rolling, which is the cheapest method, a number of sheets, called a pack, are rolled together, the number depending on the thickness to which the sheets are to be rolled. With this method, the sheet thicknesses cannot be kept within such accurate limits as with strip rolling.

By careful rolling and accurate grading, however, it is, nevertheless, possible with pack rolling to attain sufficient accuracy to permit deep drawing of larger parts. In the recently published standard leaflet, DIN 9721, tolerances for thickness are laid down for pack rolled zinc sheets based on the permissible variations in weight of the pack. When required these tolerances can also be adhered to in the rolling of zinc alloys.

Such tolerances are about twice those needed in the rolling of continuous strip. For deep drawing of larger parts, however, this is not important, because the drawing is done in several stages and the variations in thickness are thus eliminated, especially when work is carried out with a somewhat smaller die clearance. The strip tolerances are laid

... The occupation of Poland, Norway, Belgium, France and Yugoslavia has created a supply position which permits Germany to use zinc and zinc alloys as a substitute for copper, brass and other metals in apparently short supply. The following article, from Sheet Metal Industries, London, is a translation from the German by the Zinc Development Association of a recent article in *Metallwirtschaft*.

down in the standard leaflet, DIN 9722, recently published.

The difference between pack and singly-rolled sheets is also reflected in the technical properties (hardness, suitability for bending and deep drawing surface).

The various qualities of rolled sheet and strip are summarized in Tables I and II. In the case of straight zinc, values are given for commercial quality made from G.O.B. zinc; high purity made from electrolytic or vertical retort zinc; and special qualities made from mixtures of G.O.B. and high purity zinc. Rolled zinc is mostly made from straight zinc. As seen from Table I, the tensile strengths lie between about 17,030 and 51,095 lb. per sq. in. The elongation at fracture can, according to the type of rolling, reach very high values, especially with the special qualities. The Brinell hardnesses lie between 32 and, with the very hard special qualities of group H, 65 B.H. In the case of sheet and strip made from zinc alloys, Table II shows separate values for alloys of high purity zinc and for alloys of mixed zinc.

In the metalware industry the alloy group ZnCu1 (zinc-copper-manganese or zinc-copper-antimony), with strength values between about 28,385 and 42,580 lb. per sq. in. and Brinell hardnesses between about 40 and 75, is mostly used. For special purposes, alloys of the groups

Zn-Cu4, and Zn-Li are also of interest. The harder alloys of the groups Zn-Al4-Cu1 and Zn-Al10 Cu1 are chiefly used for stamping purposes.

Choice of Materials

Much information, based on practical experience, is available regarding the use of sheets and strip from zinc and zinc alloys in place of brass, copper and aluminum. With zinc and zinc alloys, it is not always possible to match certain properties of brass, copper and aluminum, so that occasionally it is necessary to alter or modify the design.

However, with the right choice of metal and careful control of the rolling, satisfactory results can usually be obtained. In particular, the following two points should be watched.

When it is desired chiefly to match the working properties of brass or aluminum and the strength properties are of only minor importance, sheets or strip from straight zinc, usually of special quality, are generally suitable.

When, however, the strength properties are more important, particularly the resistance to creep stress and to the action of higher temperatures, zinc alloys are to be preferred.

When the working properties are important, it is essential to consider what forming the material must stand. For simple forming: Cutting, bending, pressing and drawing of flat parts, the commercial quality is very

suitable. Too much, however, must not be expected as regards resistance to creep stress and to the action of higher temperatures. For difficult formings, especially deep drawing in several stages, special qualities are usually needed. Continuous strip from these special qualities is particularly suitable for impact extrusion, and can usually be obtained with zinc or zinc alloys having values of

$$Z = 0.55 \left(Z = \frac{d}{D} \text{ where} \right.$$

d = diameter of the drawn part,

D = maximum blank diameter which can be drawn without fracture into a cylindrical shape). With this drawing ratio, the properties of good deep drawing brass are very closely approached so that it is usually possible to substitute these special qualities without changing the tools to any great extent. For particularly deep drawing, high purity zinc is also suitable, but its relatively low strength must be borne in mind.

Resistance to Creep Stress

The suitability of rolled zinc or rolled zinc alloys when high resistance to creep stress is needed, is more doubtful. Although zinc alloys, in consequence of their higher strength values, as compared with straight zinc, also possess higher values of resistance to creep stress, these values are still so low, as compared with brass and aluminum, that it is necessary to proceed with extreme caution when substituting zinc alloys in such cases. By changes in design, for example, in the case of lamp brackets, by using iron inserts, a measure of success can be achieved. But it becomes more difficult when there is also exposure to the action of higher temperatures. Commercial and high purity zinc should only be exposed for a short time to temperatures up to 212 deg. F. maximum, and special qualities up to 315 deg. F. maximum, whether in use or in the process of manufacture. Most zinc alloys can stand considerably higher temperatures. They can be heated for a short time at 572 deg. F. or over, without ill effect. At excessive temperatures, coarse grain formation is caused in the sheets and strip, greatly impairing the strength, so that the fabricated articles cannot stand up to even very low mechanical strains. Consequently, zinc alloys should be used, for instance, for articles welded and soldered with the blow-lamp (with bit soldering, the heat is less) in which the joints are exposed to higher mechanical strains.

One circumstance should be emphasized: Considerable surface differences

Quality	Description	State	Sp. Gr.	Tensile ^{1,2} Strength lb. per sq. in.	Elonga- ^{1,3} tion at Fracture Per Cent	Brinell ² Hardness	Uses
Commercial quality	G. O. B. Zinc Rolling quality containing 1 per cent lead or more as per specification DIN. 1706	Pack Rolled	7.2	26,970 to 39,740	23 to 14	45 to 50	For hand working, pressing and simple drawing.
		Singly Rolled		36,900 to 51,095	40 to 23	48 to 51	Suitable for punching and stamping.
High Grade Quality	High Grade Zinc containing 99.5 per cent Zinc minimum as per specification DIN. 1706	Pack Rolled	7.1	17,030 to 19,870	60 to 52	32 to 34	For pressing, drawing and stamping.
		Singly Rolled					
Special Qualities	Zinc blended from the above men- tioned. Rolling Zinc High Grade Zinc	S (soft) ⁴	7.1	The values for tensile strength, elongation and hardness lie between those of commercial quality and high purity zinc, being adapted to the respective uses.			Mainly for draw- ing and pressing work in which higher demands are made on the working properties
		M (med.) ⁴					
		H (hard) ⁴					

¹ The values stated apply for a speed pulling of 30 mm/min. and a testing temperature of 18—22 deg. C. The strength values were determined with test-rods prepared as per specification DIN 1605 or DIN A 114.

² With regard to the considerable influence of the rolling method on the mechanical properties of rolled zinc wider ranges are sometimes mentioned for sheets and continuous strip. Moreover, in general, different strength-values are measured along and across the grain, in the case of sheets and continuous strip.

³ 2.5/31, 25/60 at 75 deg. F. and 15 sec. duration.

⁴ Pack or singly rolled.

exist between zinc and zinc alloys, and brass and aluminum. Highly polished surfaces, unless plated, are not advisable for zinc and zinc alloys. The retention of the polish by means of a colorless protective lacquer or chromate treatment is only partially possible because lacquers and other coating media have not a very long life. Consequently, even when the appearance of the article is important, high polish should be avoided when possible and preference given to matt or ground surfaces, to which protective lacquers cling better.

Instances are given below where the sheets and strip under discussion have proved efficient substitutes. Instances are also mentioned where they have not proved satisfactory, at any rate, without changes in design. For greater clearness, the examples are divided according to the different qualities of material. Space does not permit a complete review of all possible uses.

It has been found that the ordinary sheet zinc used by sheet metal workers in the building trade can also be used successfully for many hardware products. Table utensils, even of difficult contours, can be pressed out in this material, which would not, however, be suitable for deep drawing articles, such as dishes or bowls. For deep drawing, special qualities would have to be used. Another typical example of a suitable use for commercial sheet zinc (no mechanical strain, temperature action or difficult forming) is in the manufacture of badges of rank, fastening clips, etc. The good stamping quality of commercial

sheet zinc is widely used today. Metal ornaments are another example. Today, almost all escutcheons, etc., formerly made from brass and aluminum, are made from commercial sheet zinc. For stoving on the black "dipping" lacquer, however, too high a temperature is occasionally used, causing crystal growth, which, however, does not affect the useful life of the articles. It can be easily detected by a grating sound which can be clearly heard when the sheet is bent. In this connection, it should be mentioned that it is not advisable to use commercial sheet zinc for electric heating ovens, as is often done today. Zinc alloys are more suitable for this purpose, especially those of the type Zn-Cu1 and Zn-Cu4.

High Purity Zinc

Owing to its good ductility, high purity zinc is particularly suitable for the deep drawing of articles such as lugs, buttons, screw caps for flasks and flask cases. Such articles are only subjected to small mechanical strains when in use and, above all, are not called upon to withstand the action of higher temperatures. Thus, high purity zinc is not a suitable substitute for aluminum in the manufacture of crown caps for beer and soda-water bottles, although these caps can be made from it without difficulty. But, after they are pressed on to the filled bottle, a slight internal pressure is set up by carbonic acid, which affects the sealing capacity of high purity zinc. With aluminum, the sealing machine increases the clinging strength of the cap, while, with high

purity zinc, the reverse occurs. In addition, the closed bottle will probably be pasteurized (heating to about 195 deg. F.), further affecting the strength of the zinc and the tightness of sealing. This example shows that, even though the substitute material may be suitable for the actual manufacture, it may not be satisfactory in practice.

The very high working properties of the best high purity zinc make it sometimes an efficient substitute even for lead; for instance, for various fittings used in the cable and similar industries. The better bending capacity of continuous strip from high purity zinc, as compared with strip from commercial quality, often leads to the use of high purity zinc strip for purposes where commercial quality with a suitable bending capacity would also be satisfactory, or even more suitable on account of its greater strength as, for example, in the manufacture of metal picture frames. With the brass strip formerly used the frames could be profiled with sharp edges. Somewhat larger rounded edges would scarcely detract from the appearance and commercial quality could then be used without difficulty.

Thus, the design must be adapted to the particular forming properties of the substitute material.

Special Qualities

Reference has already been made to the fact that special qualities, particularly in strip form, are very suitable for deep drawing. Some special qualities match very closely the deep drawing grade of brass in their working properties and are more suitable for impact extrusion than any other rolled zinc or zinc alloy. These special qualities can be substituted without difficulty for brass or aluminum, and it is possible in most cases to manage with the same number of tools. The special qualities, therefore, are extensively used for very many metalware articles not subjected to high mechanical strain or heat, such as small caps or disks, all types of fittings, light shade supports, protective goggles and various kinds of buttons and lugs. Recently, also, attempts have been made to use special qualities for zippers, for which hitherto zinc alloys had been exclusively used. One difficulty here is that even when zinc alloys are used, the strength of the teeth is impaired on

exposure to heat, to which zinc fasteners are sometimes liable. Consequently, even zinc alloys are only suitable when the zippers are not exposed to the action of higher temperatures, as, for instance, with leather bags. But in such cases considerably cheaper straight special qualities would undoubtedly be suitable.

An example of an unsuitable use for a special quality is found in lamp bowl holders. Special qualities were used by some factories for heavy bowl holders, which were, moreover, exposed to higher temperatures through the radiation of the incandescent bulbs and which could not withstand the strain. The screws used for fixing the bowls exerted a continuous strain on the sheet, deforming it gradually to such an extent that the glass bowls could no longer be held by the screws. Only zinc alloys of superior strength are suitable for this purpose, and even so, a sufficient thickness of sheet should be used. By using iron inserts to take up the bending strain the risk of the screws being bent can be completely avoided. Only by doing so can a special quality also be used for the actual bowl holder, which is then no longer exposed to mechanical strains.

Zinc Alloys

Alloys with one per cent copper and sometimes with small additions of manganese or antimony, are those most extensively used. These alloys have good deep drawing qualities and their temperature resistance is some 212 deg. to 300 deg. F. higher than with straight zinc. Alloys containing copper and manganese have particularly good welding qualities, because the strength of the welded seams almost equals that of the unwelded material. Although the resistance to creep stress of these rolled zinc alloys is higher than with straight zinc, special care is necessary when there is exposure to continuous strain. The chief advantage of zinc alloys is that the resistance to warping and wrinkling is greater than with straight zinc. For this reason, zinc alloy sheets and strip are used for numerous metalware products, as for various lamp fittings, reflectors, etc. Other uses are for electric heating ovens, washboilers and burner tubes for geysers which are exposed to temperature influences. Besides strip and singly rolled sheets, it should be noted that pack rolled zinc alloy sheets are also being increasingly used. As mentioned when pack rolling was de-

TABLE II
Zinc Alloys¹

Abbreviated Description	Brand	Composition Percent	State	Sp. Gr.	Tensile Strength Lb. Per Sq. In.	Elongation at Fracture, Percent	Brinell Hardness
Zn-Al 1	Giesche Z14 Z1R	0.8-1 Al 0.3-0.4 Cu	Singly Rolled	7.1	31,225 to 42,580	100 to 20	40 to 70
Zn-Al 10	Zamak-eta Zamak-ete H	10Al, 0.3 Cu 10Al, 0.3 Cu 0.01 Mg	Singly Rolled	6.2	31,225 to 45,420 56,775 to 70,970	100 to 60 20 to 8	55 to 65 100 to 130
Zn-Al 4-Cu 1	Giesche Z13 Zamak alpha	4Al, 0.5-1 Cu 0.03 Mg	Singly Rolled	6.7	44,000 to 70,970	40 to 8	75 to 140
	Grillo 2105	5Al, 1 Cu 0.02 Ca	Pack and Singly Rolled				
Zn-Al 10-Cu 1	Zamak-beta	10 Al, 0.7 Cu 0.03 Mg	Singly Rolled	6.2	45,420 to 78,065	35 to 5	75 to 160
	Grillo 31010	10 Al, 1 Cu 0.02 Ca	Pack and Singly Rolled				
Zn-Cu 1	BJM9, SM WX100, Z01 ZA80 See footnote ²	1 Cu, 0-02 Al	Singly Rolled	7.2	28,385 to 42,580	20 to 100	40 to 75
		1 Cu, 0.1 Sb 0.8-1.4 Cu 0.2-0.6 Mn 0-0.1 Al	Pack and Singly Rolled				
Zn-Cu 2	B 27	2 Cu, 0.6 Mn 0.05 Al	Pack and Singly Rolled		34,065 to 45,420	80 to 50	50 to 60
	Vi H	2 Cu, 0.6 Al 0.03 Mg	Singly Rolled	7.2	46,260 to 63,870	12 to 8	115 to 125
Zn-Cu 4	Giesche ZL7 Z04, ZA94	4 Cu, 0.2 Al 4 Cu	Pack and Singly Rolled	7.2	28,385 to 59,610	70 to 10	45 to 100
Zn-Mn 1	Zinkal M	Up to 1 Mn Up to 0.5 Al	Singly Rolled	7.2	21,290 to 35,480	130 to 50	25 to 40
Zn-Li	L 21/22 Mi 38/39	Max. 0.4 Pb 0.01 Li Max. 0.8 Pb 0.01 Li	Pack and Singly Rolled	7.1	31,225 to 53,935	23 to 8	65 to 75

¹ Collected using leaflet No. 22 (July, 1941) of the Zinkberaturgsstelle G.m.b.H.
² B 13, BJM 8, BZ 1, Giesche-ZL 012, GL 1, Grillo 0150, HKZ. JZ 41, MC, MZ 2, OKZ 412, SMR, SZ 114, WKZ 1, WZ 124, Z 017, ZA 100, ZV 1, ZV 132.

(CONTINUED ON PAGE 128)

World's Most Modern

. . . In less than a year's time, this modern brass casting and rolling mill near Indianapolis was conceived, planned, built and put into production. It was built and is operated by Bridgeport Brass Co., for the Ordnance Department of the U. S. Army.

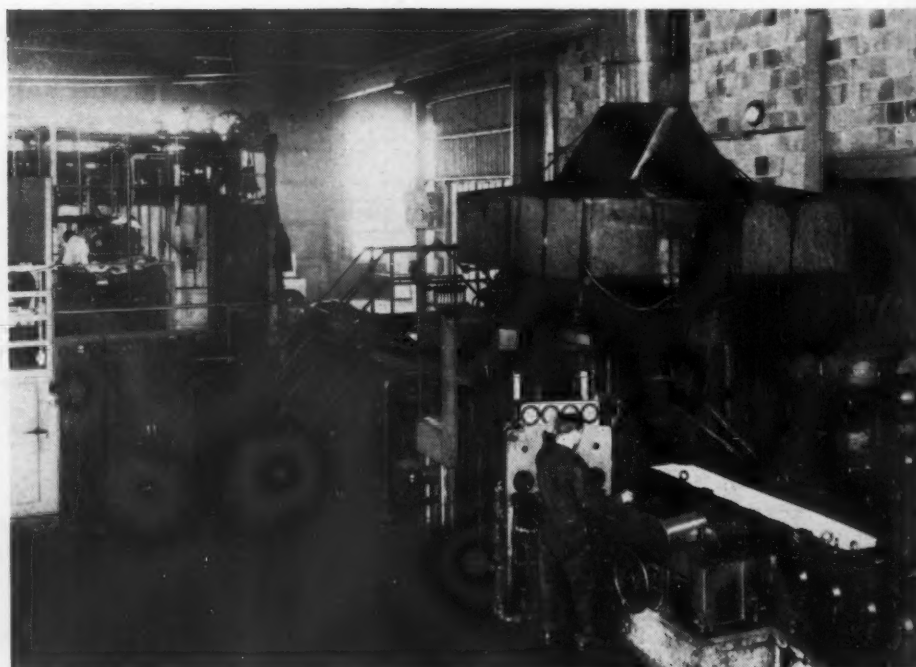


LEFT

FIG. 1—Ajax furnace pouring in water cooled mold. In this electric induction, tilting furnace, close to 1700 lb. an hr. of cold charges are melted. The furnace is designed on the principle of a primary and secondary coil wound around a steel core. In steel melting furnaces of this type, the steel charge itself is employed as the core, but in the brass furnace an independent core must be supplied. A laminated box shaped core is suspended from the bottom of the furnace, and around its upper horizontal a primary coil of several turns is wound. This is surrounded by a refractory. The secondary coil is achieved by a hole running, U-shaped, down from one side of the furnace bottom, through the core opening and into the furnace again at the other side of the bottom. The metal content of this hole forms the secondary coil, with the circulating molten metal melting the cold charge.

RIGHT

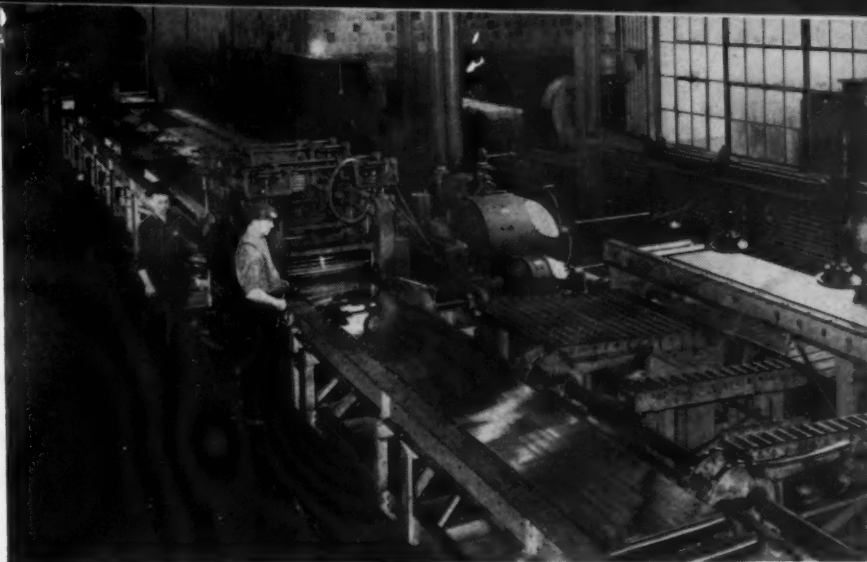
FIG. 2—Cake heating furnace (at left) and rolling mill. The cake heating furnaces are of the walking beam type, about 9 x 30 ft. each. The walking beam is unique in that one set of rails simply lifts the work off the other set and holds it up while the shuttle rails move back. It then places the work back on the shuttle rails which move it forward. Each furnace is heated by 40 gas burners. The conveyor system is located on a series of refractory piers and the space between the piers is employed as a combustion and heating chamber.



Modern Brass Mill

UPPER RIGHT

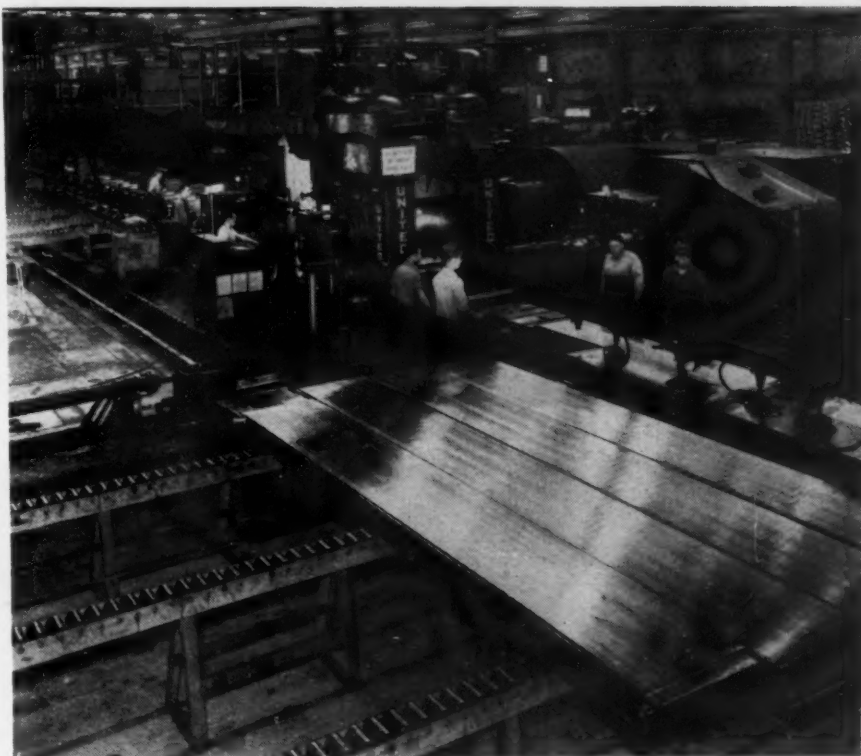
FIG. 3—The slabs are conveyed from the roller table on to a cross chain conveyor and after cooling are charged from a storage roller table onto the millers (shown above), which first one surface of the slabs is machined off, then the other, the work being turned by a flopper between the two. Milling is done on the bottom side of the slab so that the chips will fall away from the work. From this point, some of the slabs, which have been angle sheared, go directly to the blanking and cupping presses while others are cut to length for the tandem cold mill.



○ ○ ○

RIGHT

FIG. 4—At this 2-stand 4-high tandem cold mill, material is rolled down to about $\frac{1}{8}$ in. for 0.30 cal. strip. Everything from $\frac{1}{4}$ in. and lighter is coiled. For further reduction of such material as gilding metal for bullet jackets there is a single stand rolling mill.



○ ○ ○

LOWER RIGHT

FIG. 5—Extruding press, using 22 in. billets, 10 in. in diam., which are reheated in a rotary hearth 30 ft. in diam. and 10 ft. high which sets on rollers riding on two circular tracks and is water sealed. Heat is supplied by 23 burners firing through the outside wall above the work and 10 more burners in a well inside the furnace. The extruded material is in the form of flat bars, 18 to 50 ft. long.



○ ○ ○

Bridgeport Brass Ordnance Plant

has a vast cartridge case manufacturing unit integrated with the rolling and casting mill. Shown below are some of the manufacturing operations on 90 mm. cases which, together with 37 mm. and 105 mm. cases, are produced in the Indianapolis plant.

As well as supplying its own factory, the mill rolls raw material for many other cartridge makers. Most of this material is shipped out in the form of brass blanks and cups, blanks for cases from 20 mm. to 105 mm., and cups for small arms ammunition.



FIG. 6—0.30 cal. cartridge cupper. A three-part unit, about 50 ft. long, processes 0.30 and 0.50 cal. case cups, which are sent as raw material to other ammunition factories. The unit, which processes 2500 to 3000 lb. per hr., consists of three 7-plunger blanking and cupping presses (two shown), a washing machine for washing off the drawing compound prior to annealing, an annealing unit of the revolving retort type, and a pickling unit in which the work is quenched, pickled, rinsed, neutralized, washed and dried.

o o o



FIG. 7—As annealing and pickling take place after nearly every draw, including cupping, an extensive roller conveyor system has been installed to serve the first row of presses and the parallel rows of annealing furnaces (left) and picklers. The cases are moved in steel frame baskets on a three-high conveyor system, which permits unrestricted movement of full baskets to the furnaces, full baskets from the picklers to the presses, and empties.

o o o



FIG. 8—In the marking press at left, 90 mm. shells are being marked before going into the relief annealing furnace shown at rear. This furnace is 35 ft. long and houses a wire mesh conveyor 4 ft. wide which extends 10 ft. beyond the discharge end of the furnace for cooling. The shells are then weighed mechanically and packed.

Phosphate and Oxide Treatments for Steel

By F. CARL HIRDLER, JR.

Process Engineer, Turco Products, Inc.

FOR the duration, while Inconel and stainless steels are difficult if not impossible to obtain, the protection of the low-alloy substituted steels is an important problem. It is true that they may be cadmium or zinc plated or protected by other metals, but cadmium will not be allowed for plating purposes in a few months except in special cases, and zinc is so extremely anodic to steel that in certain instances it may not be desirable. Chromium, nickel, and copper not only are cathodic to steel, but are even more critical at present than cadmium and zinc.

These facts are amplified in Tables 1 and 2. Materials close together (having practically the same potential) are not very reactive to one another, whereas those separated by a great distance in the table would be extremely reactive.

As a result of this situation the phosphate chemical surface treatment for steel is becoming popular. Phosphate-type coatings for steel have been known since 1869, the date of issuance of the first patent on this subject. Since that time, over 100 patents have been issued, covering various phases of this work.

It is now possible, by varying certain factors such as cleaning, surface finish, type and concentration of solution, temperature, time of immersion, and after-treatment, to obtain phosphate coatings of varying thickness, porosity, and corrosion resistance.

The primary type of solution for applying these coatings to steel is composed mainly of the orthophosphates of iron and manganese, or of the orthophosphates of iron and zinc. Often these solutions incorporate free phosphoric acid. In some instances fluosilicic acid, or a soluble fluosilicate

... The author considers phosphate the likely war-time substitute for cadmium and zinc plating for certain applications. He gives a detailed account of the phosphate coating process and its advantages, and reports similarly on the other principal inorganic steel surface treatment, oxide coating.

is added to impart additional corrosion resistance to the coating.

Steel parts immersed in such a solution will receive a coating composed mainly of interlocking crystals of secondary and tertiary iron and manganese, or iron and zinc, phosphates. The exact chemistry of these reactions is not too well known, as several authorities on this subject are not in complete agreement. Various solutions are on the market today, under proprietary names, which are satisfactory for producing corrosion-resistant coatings on steel. It is to be understood that all the more advanced types are covered by recent patents.

In order to produce a reasonably satisfactory coating in a short period of time, modifications of the solutions above described have been developed which contain accelerators. Both metallic copper and nitrates are used, but nitrates seem to be preferred. By using proper proportions of accelerator and spraying the hot solution on the steel, it has been found that satisfactory coatings can, in certain instances, be obtained in 1 to 2 min.,

instead of the 30 to 60 min. required by the standard processed.

It is mandatory that parts being processed be free from dirt, grease, rust, and scale if best results are expected. The solution in itself will act as a rust remover, but in so doing it will deposit a coating of inferior corrosion resistance. Should parts be rusty or scaled, it is suggested that they be pickled in sulphuric or muriatic acid and thoroughly rinsed prior to phosphate treatment.

After treatment, parts should be given a thorough rinse in hot water to remove solution and products of reaction.

Due to the fact that it is almost impossible to rinse solutions from parts completely, even with running fresh water, it is recommended that parts be given a passivating treatment by dipping them, for about 1 min., into a 0.5-1.0% solution of chromic acid at a temperature of around 180-200 deg. F., especially in the case of parts given the short-time treatment. This chromic acid materially increases corrosion resistance and neutralizes any active agents

Fifty-ninth in a Series of Articles on the Technical and Economic Aspects of Metal Cleaning and Finishing

TABLE I

Anodic	Mg	52S	4S	2S 3S	A17ST	17S	steel chrome plate 18-8 stainless brass monel	Cathodic
	Zn			53S Alclad	cadmium X-4130	24S		

X-4130 may be variable and may at times act as ordinary steel.
Any material will be anodic in contact with any other materials shown in a column to the right in Table I, and will afford anodic protection to such materials.

which were not removed by the hot water rinse. In addition, the heat will assist in the drying of the parts.

Steel so processed will usually have a gray surface, and will probably show brown or tan colored streaks. These streaks are chromic acid stains and do no harm. In fact, they usually add to the corrosion resistance and subsequent paint adhesion. This may be exemplified by the chromic acid dip, required by Army and Navy specifications, on parts after cadmium and zinc plating. This chromic acid dip neutralizes the cyanide and caustic on the parts, brightens them to some extent, and adds materially to the corrosion resistance and subsequent paint adhesion. Even though 0.00001 in. or so of plating (or phosphate coating) is removed by the chromic acid, intensive investigation has shown that corrosion resistance is still greater than on untreated parts, and considerably greater than on parts given a nitric or sulphuric acid bright dip. It is common knowledge that alkalinity on the surface of any material greatly reduces the paint adhesion. In addition, unpainted parts contaminated with alkaline products on the surface may easily be the cause of corrosion to adjacent aluminum parts at a later date. For these reasons it is necessary that the

chromic acid dip be the last operation, and that the chromic acid rinse be used for no other purpose.

After drying, parts may be dyed black with hot water soluble dye. This will not add appreciably to the corrosion resistance.

The new U. S. Army specification 57-0-2B gives a table listing standard salt spray requirements to be met by the various finishes. The applicable salt spray specification is AN-QQ-S-91. Zinc plated parts must not show failure after 48 hr. in the spray. Dry phosphate coatings must withstand 3 hr. and oiled coatings 24 hr. Dry oxide types of finishes must withstand ½ hr., and oiled coatings 2 hr. Ordinarily, cadmium plated parts are required to withstand 250 hr.

It can readily be seen that this new specification will not give a true picture of the corrosion resistance of the various coatings, as there are on the market today rust preventive oils which will withstand 500 to 1500 hr. in the salt spray on bare steel.

According to test results from at least one major aircraft company, properly applied and passivated dry phosphate coatings will withstand approximately 100 hr. in the salt spray against 2 to 6 for dry oxide types of coatings.

A drying type oil finish to be ap-

plied over phosphate coatings has recently been developed. It is readily adsorbed into the pores of the coating and gives an abrasion resistant finish. Regular primer and lacquer coatings may then be applied over this finish. Without additional paint coatings, test panels have withstood nearly 1000 hr. in the salt spray. If coats of primer and lacquer are added, over 2000 hr. could be expected.

One serious drawback of cadmium plated parts is the fact that threads give galling and flaking troubles. Government aircraft specifications do not allow undercutting of threads to be plated. This difficulty is overcome in the use of phosphate coatings, which do not flake or gall.

Phosphate coatings will usually average about 0.0002 to 0.0005 in. a side, depending upon the type of cleaning used. Tests show that vapor degreasing and alkaline cleaning give two different thicknesses of deposit.

Due to their nonmetallic nature, these coatings are fairly poor conductors of electricity. Accordingly, spot welding would not be practical and special precautions should be taken when electrical bonding (grounding) of parts is desired.

The other general type of inorganic chemical surface treatment for steel is the oxide coating. The oxide process consists of boiling the steel in a solution composed of water, sodium hydroxide, and various other chemicals, such as sodium nitrate, sodium nitrite, sodium chromate, etc. These other chemicals vary according to the exact proprietary compound being used. Most of the mixtures which will give pleasing results are patented and are put out under proprietary names. After the above treatment the parts are rinsed in water and oiled, usually with a soluble type of oil. Due to the fact that large amounts of chemicals are dissolved in water to make up the solution, the boiling point is quite high, often as much as 400 deg. F.

Operation of the tanks is fairly simple. Inexperienced operators may handle the whole procedure in most cases.

The average setup consists of a cleaning tank, rinse tank, hot solution tank, rinse tank, and oil tank. If badly rusted steel is to be processed, a pickle tank and a rinse should be provided. Certain of the proprietary processes recommend two processing tanks, to be used at different concentrations and temperatures. These are merely variations of the basic process.

There are several advantages to the oxide process. Cleaning of parts prior to processing is not too critical, as

(CONTINUED ON PAGE 128)

TABLE II

Negative Potentials (in Volts) as Measured by a Calomel Half-Cell Using a Normal NaCl Plus 3 Per Cent Hydrogen Peroxide Solution

Magnesium Alloys	magnesium	1.73	Aluminum Alloys	cadmium	0.82
	AM3S	1.71		365-T4	0.81
Aluminum Alloys	AM57S	1.68		355-T4	0.78
	AM240-T4	1.66		A-17ST	0.73
	zinc	1.00		195-T4	0.70
	220-T4	0.96		17ST	0.68
	72SO	0.96		24ST	0.68
	214	0.87		mild steel	0.67
	56SO	0.87		lead	0.55
	pure Al (7A)	0.85		tin	0.49
	52SO	0.85		chrome plate	0.35
	2SO	0.83		60-40 brass	0.28
	2SH	0.83		copper	0.20
	3SO	0.83		18-8 stainless	0.15
	3SH	0.83		Monel	0.10
	53SW	0.83		silver	0.08
	53ST	0.83		nickel	0.07
	61ST	0.83		Inconel	0.04
	43	0.83			

Standard Carbide Tips For Special Tools

By PAUL W. MILLER
Chief Engineer, Carboloy Co., Inc.

THAT it always costs less to produce a standard item in mass production than a similar item to special order is of course too well known to require any explanation. That this applies to cutting tools is also becoming widely appreciated, as evidenced by the tremendous increase



FIG. 1—By using a standard size carbide tip (dotted line), the tool cost is actually less than for the special tip designed for this chamfering tool.

in usage of standard carbide tipped tools for all kinds of machining operations.

However, there are many applications where a strictly standard tool cannot be used or even where a standard tool cannot be readily converted to a special by simple grinding operations.



FIG. 2—The standard tip is $\frac{1}{8}$ in. wider than the special tip called by the designer of this offset tool but costs less.

For such applications most manufacturing organizations follow the normal practice of designing special carbide tools "from scratch." The selection of tip sizes in such cases is

quite frequently based primarily on the minimum requirement for the specific machining operation, taking tool life required into consideration, of course. While this is fundamentally the correct practice, it may lead to a higher than necessary tool cost today if the ready availability of mass produced standard tool tips is not taken into consideration.

Frequently it has been found that such tools are designed with tips that differ only slightly from the large

FIG. 3—Another example where a somewhat wider standard tip showed a saving in cost and a gain in overall tool life.



number of standards available from stock. The net result is that the cost of producing the tool as designed is considerably higher than necessary, since a special tip has to be put

through the shop at a considerably higher manufacturing cost.

As a matter of fact it has been found that in many cases it is possible not only to reduce the cost of the tool by adopting a standard tip size, but also to increase its life. This is due to the fact that the differential in manufacturing cost of standard as against special tips is such as to permit use of a larger standard tip at an actual saving.

Whenever possible, at Carboloy it has now become standard practice therefore to substitute or recommend the substitution of standard tip styles and sizes for special tips in specific tools whenever the resultant tool life is equal to or better than that of the proposed special tool.

Illustrated are a few typical examples of such substitutions, together with the savings involved. Fig. 1, for instance, illustrates what was accomplished on a chamfering tool. The solid lines indicate the tip as drawn by the user's tool engineering department while the dotted lines indicate the nearest larger size Carboloy cemented carbide standard tip. Here the standard tip, produced in large quan-

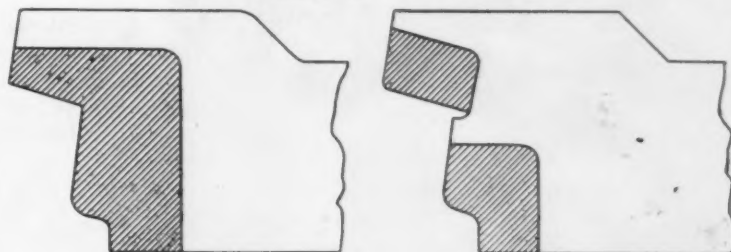


FIG. 4—The use of a standard carbide tip for this shell turning tool showed an enormous saving in cost on an order for 1000 tools.

tities for stock, actually costs less than the smaller special tip. The difference is quite appreciable, too. Even if ordered in large quantities, the tool would have had a tip cost of 97c. as designed, against 65c. for the $\frac{1}{8}$ in. larger standard tip.

The saving is directly reflected in the total tool cost since the amount of labor required to grind the end of the tool to the needed special shape is the same, regardless of whether a standard or special tip is used. Furthermore, the increase in length of the standard tip as against the special

FIG. 5—Example of the substitution of two standard tips for a single wide tip of special shape on a forming tool.



means an increase of at least 20 per cent in life of the tool in addition to its lower initial cost.

The application of the principle of specifying standard tips to save money is also well illustrated in the offset tool in Fig. 2. Here the standard tip is $\frac{1}{4}$ in. wider than the special tip with which the tool was designed. Yet the saving may be anywhere from \$2.73 to \$0.49, depending on the quantity purchased. A further saving could also be made in this case by the purchase of a standard stock offset tool, and grinding this tool to the special shape required.

On single tool orders the cost of such a standard offset tool would actually be within 5 per cent of the cost of the single special carbide tip alone. On one order for 100 such tools, the total saving in using standard offset tools would have been \$94.

The cost of the tool illustrated in Fig. 3 was materially reduced while increasing life by using a slightly

wider standard tip of the same length and thickness as the special tip specified. The saving per 100 tips here is roughly \$23, while a single tool order would have meant a reduction of \$1.73 by substitution of the standard tip.

Here again, however, a further saving could be accomplished by also changing the shank specifications slightly to enable the use of a standard stock tool. The actual figures, in single tool lots show the special tool with standard tip almost $3\frac{1}{2}$ times the cost of the standard tool, while to produce the tool as designed would cost roughly $4\frac{1}{2}$ times as much as the standard tool.

An even larger saving in tip cost alone is shown in the shell turning tool in Fig. 4. Here again, a standard tip was available just $\frac{1}{4}$ in. longer than the special tip indicated. The saving involved in substituting the longer lived standard tip here amounts to \$1150 on a single order of 1000

tools with an increase in life of approximately 10 to 15 per cent.

A still better example of the savings possible through the adoption of standard tips is shown in Fig. 5. The tool at the left, shown as originally designed, is a special forming tool for machining of an alloy steel casting. The tool was redesigned as shown at the right, using a standard tip and a smaller special tip. The net saving per tool amounted to slightly over 50 per cent of the total original tool cost in the quantities involved. Yet the tool as redesigned with two tips was every bit as effective as the original design and had the additional advantage that if a tip should be accidentally broken, only one portion had to be replaced.

In addition it might be mentioned that the specifying of standard instead of special tips may also mean a saving in delivery time, since the availability of a standard tip from stock frequently may reduce the overall processing time.

Super-Hard Rivet for Aircraft

NORTH American Aviation, Inc., announces the development of a super-hard rivet strong enough to replace bolts on aircraft or other structures where the fastening member is subject to shear loads.

The new rivet has considerably lightened the weight of the "laminar flow" wing of the P-51 Mustang fighter. Use of the new rivets has effected a 60 per cent weight reduction in relation to the equivalent bolts and rivets previously used. Such an important weight reduction is particularly valuable in a combat airplane design like the Mustang.

Nearly 1000 of the new rivets, which can be installed five times



THE Hi-shear rivet, too hard to head, is fastened with the aluminum alloy collar shown at the right.

faster than bolts, are used in the Mustang's wing, replacing a large number of regular rivets and 798 heavier bolts.

The secret of the new rivet, which has been named the Hi-shear rivet, is in the method of installation. With a shear strength of 75,000 lb. per sq. in., compared with a normal rivet's shear strength of 25,000 lb., the Hi-shear rivet is too hard to be driven in the usual manner. Instead, it is "riveted" into place by a special tool that presses a tiny aluminum alloy collar into the notched end of the stud, leaving a modified conical head. Excess length of the collar is sheared off automatically by the tool during the operation by pressure against the sharp edge on the tip of the stud.

The new rivet was developed by George Wing, a North American Aviation engineer, who also invented a special tool employed in the riveting operation. The rivets come in two styles of heads, in several diameters and in lengths to suit all conditions. Two or more regular rivets are required to equal the strength of one Hi-shear rivet. The new rivets are being made available to other war manufacturers.



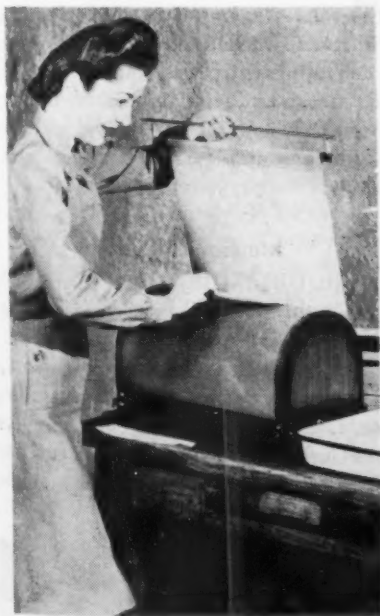
SPECIAL tool used in air hammer for driving the North American Aviation super-hard rivet.

New Equipment . . .

Plant Service Apparatus

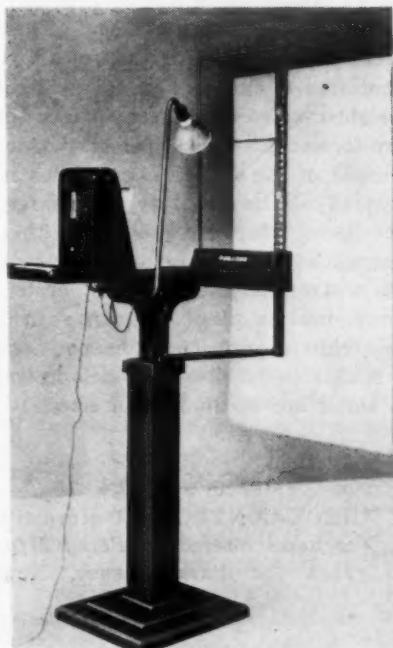
Further developments in lighting equipment, communication systems, safety clothing and other plant service apparatus are described herein.

A SIMPLE, practical machine, offered by the *American Photocopy Equipment Co.*, 2849 N. Clark Street, Chicago, can be operated by anyone after a few instructions, and produces perfect copies of anything printed, written, typed, drawn, or photographed. The machine makes copies of anything up to 18 x 22 in., can be set up on a desk or table, and no darkroom is needed. The print is developed, fixed, washed and dried after removal from the machine. Government reports, statistics, duplicates of orders, copies of blueprints and tracings, confidential reports and contracts can be made on this machine.



Identification Unit

A PORTABLE photographic unit made by *Photographic Equipment, Inc.*, 210 East Park Way, Pittsburgh, makes it possible to take iden-



tification pictures at a moment's notice. The model B WIM unit does not require trained personnel to produce clear and sharply detailed pictures. The unit is compact and sturdy, and requires very little operative space. The camera is loaded with 35-mm. film and the print is 1 x 1½ in., suitable for identification badges and pass cards.

Inter-Communication System

A NEW development in intercommunicating systems is announced by *Fred E. Garner Co.*, 53 East Ohio



Street, Chicago. A combination all-master system that greatly facilitates factory and office inter-communication, the "president's model Convers-O-Call" is available for 10 to 30 stations. It is possible to page an entire factory or communicate privately with one or more departments instantly and easily. There are no switches to push while talking. All conversations are strictly private. Voice transmission is said to be clear and easy to hear. The system can easily be installed by a plant electrician or local electrical or radio shop.

Wooden Locker

FOR a wartime locker compartment, the *Sanymetal Products Co., Inc.*, 1705 Urbana Road, Cleveland, uses pressed hard fiberboard to



provide a locker compartment capable of giving users a satisfying sense of privacy and protection for personal property. Although not waterproof,

it is moisture resisting, due to its hard compressed form; and while it cannot be considered fireproof, it is so slow to burn that it offers almost as much protection as steel. Pilasters and locker compartment sides are assembled at the factory, thereby reducing assembly time on the job. A range of types and sizes of locker compartments is available for working out installations for 10 to 10,000 employees.

Reinforced Gauntlet

AN improved type steel reinforced gauntlet for heavy duty handling is offered by *Industrial Gloves Co.*, Danville, Ill. Though heavily reinforced, the glove is flexible because grain leather is used. Steel ribbons are placed diagonally to assure protection against cutting edges



of material handled. Entire palm, extending from first joint of all the fingers and well around to the back of the forefinger is reinforced with an extra piece of leather. Thumb is patched and strapped for extra strength and service. One style of the steel reinforced gauntlets has been adapted for women's wear. Gloves may be had as pairs, all rights, all lefts, or any combination of rights and lefts as required.

Safety Equipment for Women

THE BOYER-CAMPBELL CO., Detroit, offers a line of safety equipment for women in industry, including protective clothing, caps, aprons and hair nets, also face shields and respirators to protect eyes and lungs from flying particles and emery dust. The clothing, while practical, has been designed by nationally known costume designers.

Plastic Identification Badge

AN all-plastic identification badge which is light-weight, thin, durable and strong, has been placed on

the market by the *Royal Emblem Co.*, 41 John Street, New York. It is made in two parts, each having specially formed edges which, when assembled, fit tightly into one another and become a one-piece unit. No tools or special equipment are required for its assembly and it meets government requirements. The clasp can be had in two forms—a spring pin type which is set into the case and the other, a safety catch securely riveted onto the back of the case.

Protective Helmets

THE STRAUSS CO., 901 Ewart Bldg., Liberty Avenue, Pittsburgh, announces a line of protective helmets for factory women. These helmets are molded from vulcanized fiber into a one-piece, seamless light weight crown, with a second piece of pre-formed fiber attached to the underside of the crown to reinforce it. Instead of the usual type of safety hat lining, they are provided with a hammock which rests directly upon the wearer's hair. The head protector is held in place with an adjustable chin strap. These helmets are available in black or tan colors and in small and medium head sizes.

Turnstile System

CCHECK-CONTROLLED turnstile systems offered by *Perey Mfg. Co., Inc.*, 101 Park Avenue, New

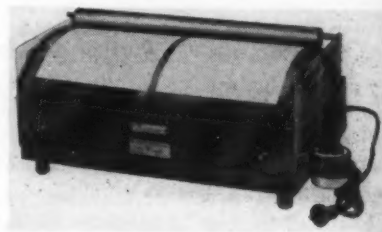


York, have been designed to meet the individual requirements of auditing departments. In a typical system, each employee is issued two checks with his number stamped on them. To gain admission to the plant or to leave it, each employee must deposit one of these checks in a check controlled turnstile, located at the entrance. When the check is deposited,

it unlocks the turnstile, admitting the employee and automatically recording him on a register.

Blue Print Machine

A PRACTICAL, low-cost machine, called the Spee-Dee printer, has been developed by *Peck & Harvey*, 4325 Addison Street, Chicago. With the machine either blue prints or



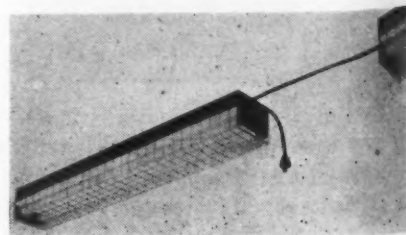
black and white prints can be made in $\frac{1}{2}$ min., it is claimed. Exposure time is frequently as little as 20 sec. Developing time for a black and white print is only 10 sec. The unit is a table model and can be plugged into any standard electric outlet. It comes in two sizes, for prints up to 12 x 18 and 18 x 24 in. The actual printing surface is oversize on both machines, which prevents crowding of prints, overlapping or blurred edges.

Eye Glass Fog Preventor

A NEW product, manufactured by the *Carhoff Co.*, 3050 Kensington Road, Cleveland, prevents fogging when applied to eye glasses, goggles, gas masks and windshields, its makers claim. The material, known as "No-Fog," is supplied as a paste in glass jars.

Mechanic's Light

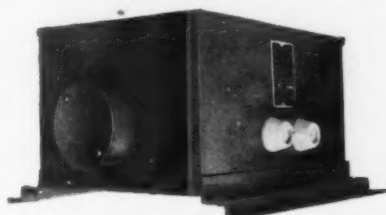
A DOUBLE-CIRCUIT mechanic's light with receptacles for plugging in small power tools and additional fixtures is being produced by the *Lumidor Mfg. Co.*, 3120 East Pico Boulevard, Los Angeles. As many as four lights can be connected in line to a maximum of 60 ft. from a single



outlet. A 24 in. unit containing two 20-watt lamps are available for either 50 or 60 cycle current and have high power factor to eliminate flicker. Brackets for hanging and a hinged wire lamp guard are standard equipment, with twist-lock fitting on the plug and receptacle available at extra cost.

Lighting Transformer

THE ACME ELECTRIC & MFG. CO., Cuba, N. Y., has introduced a new style cold cathode lighting transformer especially designed for industrial applications. It is a heavy duty, vibration-proof unit with a capacity of 120 miliamperes in 3000, 4000, 6000, 9000, 12,000 or 15,000 volt secondaries, with a standard conduit box for primary connection and built-in parallel electrode housings



for direct connection of cold cathode tubes. Installations under test have shown continuous operation of 20,000 hr. and more without appreciable loss in light output or replacements of tubes.

Lamp Filter Hoods

SAFETY hoods of permanent natural blue or green colored glass, are being offered by **Reynolds Electric Co.**, 2650 West Congress Street, Chicago. They slip easily over a standard lamp bulb, being held in place by a wire spring and can be removed for cleaning. The hoods last indefinitely and can be replaced on a new bulb. It is claimed that use of these hoods filter out the harmful red and yellow rays, thus banishing eye strain.

Swiveled Lighting Units

A LINE of machine-lighting units is being manufactured by **Reliance Devices Co., Inc.**, 510 Sixth Avenue, New York, with a patented spring construction inside the base and socket. It is said to be unaffected by machine vibration and is oil and dust resistant. Spring tension con-



struction holds complete unit in place at any angle. It is offered in a choice of arm lengths, with switch in base and keyless socket or switchless base and key socket, and three types of shades.

Rolling Wood Grille

USING the minimum amount of critical material, **Cornell Iron Works, Inc.**, 26th Avenue and 13th Street, Long Island City, N. Y., offers a rolling door grille, which uses wood bars strung on light steel tapes operating up and down in wood guides in place of steel. It coils overhead on a horizontal counterbalancing shaft, and takes up no wall or floor space. It locks into the side guide with a padlock and hasp on the bottom bar. This wood grille makes a substantial barrier and can be fabricated for opening widths up to 19 ft. and opening heights unlimited. Operation is either push up, or for larger sizes, by hand chain or electric motor.

Reflector Fastener

TO save time and trouble in installing and cleaning its line of reflector fluorescent fixtures, **Sylvania Electric Products Inc.**, Salem, Mass.,



offers a spring-type fastener that holds the reflector securely to the top housing. The latch requires only a quarter turn to remove the reflector

and no tools are needed. It is inconspicuous in its position between the lamps and does not affect the appearance or efficiency of the reflecting surface.

Paging System

BELL SOUND SYSTEMS, INC., 1183 Essex Avenue, Columbus, Ohio, is manufacturing a rugged unit for paging, signaling and announcing which is so arranged that a system can be installed by a plant electrician and then expanded as requirements increase by adding additional standard units. An on-off switch, a microphone and a phonograph unit are located at a control station, with control amplifier and

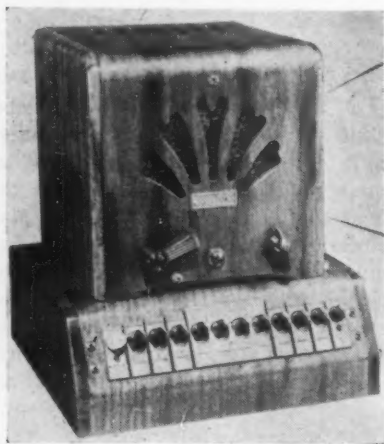


one or more speaker amplifiers located at convenient points. These units are wired together and tapped into a.c. power source. Control circuits are of low voltage type, and the control amplifier is relay operated. It is capable of controlling up to six 100-watt speaker amplifiers. Under average conditions, one amplifier will adequately handle up to 15 speakers.

Annunciator Selector

THE central control master station developed by **Executone, Inc.**, 415 Lexington Avenue, New York, is equipped with an annunciator selector having a buzzer and name tabs which illuminate to identify incoming calls. Built into a detachable base which can be easily replaced with larger-capacity selectors for future expansion, this new unit enables the user to talk individually to up to 11 other remote stations in the system, or page them all simultaneously. Any other station in the system can signal and register its call on the master station's annunciator selector. The unit is also provided with a tone signal which can be transmitted selec-

tively or simultaneously to all other stations in the system. The top portion of the unit is an amplifier which



delivers up to 4 watts of audible sound output. It incorporates a sensitive microphone speaker which transmits two-way conversation.

Air Filtering Cartridge

THE AMERICAN OPTICAL CO., Southbridge, Mass., announces an air-filtering cartridge for its respirator to protect lungs against a combination of all types of dusts. The facepiece of the respirator contains a compartment into which a cartridge can be inserted, seven of which have been designed for interchangeable protection against common respiratory hazards faced by industrial workers.

Extension Light

ADDING to its line of safety equipment for industry, the *Davis Emergency Equipment Co.* of 45 Halleck Street, Newark, N. J., has designed a new safety extension light which is said to be safe against electric shock, even when the guard is removed. The light is so designed that a guard of heavy fiber serves as the on-and-off switch. When it is unscrewed the current is automatically cut off. The entire device is made of non-conductive materials, removing the hazard of electrical shock and the danger of short circuits. Bulbs are replaced quickly since the guard is removed without the use of tools.

Green Ray Light Bulbs

VERD-A-RAY is the name of a new form of light offered by *Save Electric Corp.*, Toledo. These bulbs may be used in all standard incandescent fixtures. Verd-A-Ray lamps

cast a pastel green hue on white substances, making them glare-free, as they have a dispersive inner surface with a coating of vitreous glass enamel which contains reflective green pigment with an index of refraction materially different from that of plain glass, allowing a total emission of light equalling from 85 to 95 per cent of that emitted from an otherwise similar unpigmented bulb.

Self-Adhesive Stickers

THE self-adhesive sticker offered by *John H. Riordan Co.*, 816 West Fifth Street, Los Angeles, can be used successfully, according to the maker, in extreme heat, cold, humidity and constant temperature change. When covered with varnish, it is impervious to salt water. Replacing decalcomanias, it requires no moisture and will adhere to any smooth surface (wood, metal, glass, paint) until intentionally removed. It can be peeled off without tearing or scraping and leaves no marks on removal. The stickers are available in stock sizes or special sizes, shapes and colors.

Safety Hats

INDUSTRIAL head protection for women is provided by *Standard Safety Equipment Co.*, 232 West Ontario Street, Chicago, which has developed safety hats in several different models and colors. When worn properly, all the hair is enclosed. The visor and semi-stiff top serve as warning bumpers if wearer leans too close to moving machinery. They are cool, weigh less than 3 oz., and all material used is sanforized, preshrunk and color fast.

Fire Extinguisher

A CARBON dioxide fire extinguisher is now offered by the *General Detroit Corp.*, 2200 East Jefferson Avenue, Detroit. It is known as the C-D/Fog. It is claimed the carbon dioxide discharge of C-D/Fog kills fire in a few seconds by penetrating to every corner where fire exists, excluding and replacing the oxygen necessary to combustion. It may be discharged safely on live electrical equipment and the discharge leaves no trace on the finest mechanism or material.

Burn Treatment

A NEW treatment for burns, cuts, and abrasions, offered by *Sperti, Inc.*, Cincinnati, incorporates a newly

discovered substance known as biodynes, which are given off by cells when injured. It is claimed that biodynes have the power to stimulate cellular growth and respiration, resulting in more rapid, effective healing. The ointment is available in 1-oz. tubes, 15-oz. and 5-lb. jars.

Protective Cream

A SOOTHING, stainless and greasless cream is prepared by *Donald Merrell & Co.*, 227 Grove Avenue, Wyoming, Ohio, for the treatment of occupational dermatitis. It is compounded from coal tar products specifically to treat skin conditions caused by working with various acids, chemicals and oils found in almost every industrial plant, and is effective in alleviating and healing the more serious cases of eczema, seborrheic dermatitis and eczematoid dermatitis.

Chemical Cartridge Respirator

FOR protection from paint and lacquer sprays, chemical fumes, smoke, nuisance gases and light concentrations of organic vapors, *H. S. Cover*, South Bend, Ind., is manufacturing a chemical cartridge respirator with new design chemical cartridges made of colored plastics. The plastic cartridges are sturdy and won't crush and spill contents. Ability to change filters as needed adds greater efficiency and longer life to chemicals in cartridges. Weighing less than 8 oz., the molded rubber facepiece gives an air-tight fit. Adjustable headband holds respirator firmly in place and does not interfere with vision or spectacles.

Plastic Respirator

AN efficient, compact, lightweight respirator made of transparent plastic has been made available by *Mine Safety Appliances Co.*, Brad-dock, Thomas, and Meade Streets, Pittsburgh, which is stated to be durable, odorless, non-corrosive and a non-conductor of electricity and heat. The transparent construction makes it possible to inspect the filter without removal from the respirator. It can be disassembled without tools. With the exception of the single filters which permit a fresh new filter with each cleaning, all parts are interchangeable and can be washed and sterilized. Goggles or head coverings can be worn without interference.



One of the strangest Murders of all time

This is not a pleasant story. We are about to name the murderer in a case that has long been listed as suicide . . . and that murderer is still alive, known to many who read this story.

It happened many years ago. A man named John Fitch was supposed to have taken his own life. The truth is, he was killed — in one of the most reasonless, strange and brutal of all crimes.

He was a shabby man, who tramped through life with the frenzy of a fanatic, clutching a vision under his arm — the plans, designs and models of an invention that would revolutionize this world and bring a new era of wealth and progress to the people of his country . . . They told him that it couldn't be done.

For 15 years he shouted in a wilderness of deaf indifference, hammered at the closed doors of political thought, was branded as crazy, humiliated in public, bereft of funds, and finally killed. They say that he took an overdose of narcotic pills, but John Fitch was murdered.

He was murdered by indifference! Ignorance, stupidity and political blindness killed John Fitch — but not the vision he had offered to the world. It was the plans of a steamboat, designed, built and successfully operated 20 years before the world ever heard of the man named Robert Fulton.

We have a purpose in telling this story. It's simply this: Men are still murdered by indifference. Vision is still the victim of "It can't be done", *perhaps now more than ever before!* And because this is true, we believe that a single fact about Jones & Lamson may be important to you.

Today, the foremost engineers and designers in America are entrusting their plans and problems to Jones & Lamson for counsel, service and technical assistance in the use of precision machine tools.

If it CAN be done . . . and if tools are needed to do it . . . Jones & Lamson engineers and service men are considered among the best qualified in America to help you. Call upon them!



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Profit-producing Machine Tools

• **Edsel Ford death strikes hard at top administrative ranks in company; "first line" group has been narrowing in recent years . . . Problems of estate taxes also are foreseen.**



DETROIT — Henry Ford succeeded to the presidency of the Ford Motor Co. Tuesday of this week, but the death of his son, Edsel Ford, left twin problems of the company still in immediate focus. The twin problems are administrative personnel and, less important, liquid funds. Solutions can be expected for both, but their shape is not immediately evident.

The highly centralized administration of Ford Motor Co. has resulted in somewhat limited development of "second line" officials trained to step into breaches created in the "first line" of operations. Henry Ford's accession to the place occupied by his son does not cure this, particularly since the elder Ford has little liking for the details of office work. On the second problem, it can be pointed out that inheritance taxes which will be levied against the Edsel Ford estate quite obviously will constitute a substantial drain on its holdings; inasmuch as the Ford Motor Co. and the Ford family are synonymous, any depletion of quickly convertible funds from the one may inevitably involve the other.

The actual ownership of the motor company is shrouded today in mystery which likely will not be cleared up until an inventory of the estate is filed in probate court. And then, much time will be necessary before valuation can be put on those holdings, for the worth of Ford stock, unlike that of publicly-owned companies, is not

determinable on a supply-and-demand basis. The last statement filed by the company, as of Dec. 31, 1941, shows book value of \$629,943,031 for the 3,452,900 shares outstanding. Of the 3,452,900 shares, Edsel Ford has been credited in newspaper reports as owning at least 40 per cent, this figure deriving from an old analysis made as of 1919. It is believed, however, that considerably more of the stock interest has been transferred since 1919 by Henry Ford to his only son, and some hypotheses is that Edsel Ford was before his death the primary and near-exclusive owner.

But even if the Edsel Ford estate includes no more than half the ownership of Ford Motor Co. it would have a valuation of some \$300,000,000 or so. This will be subject to federal tax of about 77 per cent, plus Michigan state taxes which may range up to eight per cent after comparatively small exemptions.

POPULAR belief in Detroit is that the family had set aside at least a few hundred million dollars in government bonds to provide liquid assets for the payment of inheritance taxes. The large question immediately arises whether these were in Henry Ford's or Edsel Ford's name. If in the name of the father, transfer to the Edsel Ford estate would be necessary before these assets could be used, and this might entail a maximum gift tax levy of 57½ per cent, or else, if traded for company stock in the estate, the result would be to revert the shares to Henry Ford and thus reinstate the problems which transference from father to son in the past had sought to avoid.

More likely, however, is the possibility that such contingencies have been provided for in one way or another. Gaining credence in Detroit this week, pending the filing of details of the Edsel Ford will was the report

• • • The other officers of Ford Motor Co., in addition to Henry Ford as president, which were elected Tuesday, are: vice-president, Charles E. Sorenson; vice-president and treasurer, B. J. Craig; secretary and assistant treasurer, H. L. Moekle; and, directors, Henry Ford, Henry Ford II, Benson Ford, Charles E. Sorenson, Mrs. Eleanor Ford, Mrs. Edsel Ford, H. H. Bennett, M. L. Bricker, B. J. Craig, and R. R. Rausch.

Services Get Use of Auto Proving Grounds

South Bend, Ind.

• • • Studebaker Corp. has turned its proving grounds, 12 miles west of South Bend, over to the Chicago Ordnance District for military vehicle testing. Use of the grounds by the Army will begin early this summer, conducted by Studebaker Corp. engineering staff under a contract with the Chicago Ordnance District.

The General Motors and Packard proving grounds in Michigan are already being widely used by the Army. Turning over of the Studebaker grounds gives the services use of all the principal testing facilities of the automotive industry.

that actually there were two issues of stock for Ford Motor Co., one small voting issue and one large non-voting issue. The large issue, ran the report, would be turned over to charity and would thereby go tax-free. The small voting issue would be retained in the family, keeping control of the company there and thereby by-passing the need of enormous inheritance taxes.

In such a case, of course, most of the earnings of the company would be lost to the Ford family, but in the event of direct inheritance only a small share of the actual bequeathment would get by the tax barrier anyway.

In any case, the drain on liquid assets within the Ford family will be tremendous. They can be expected to complicate the development of further cash accumulations to protect against the ultimate future death of Henry Ford.

From the corporate standpoint the problem which is immediately at hand is that of the gap left in top management. The operation of Ford Motor Co. has been in the hands of a very small group. Founder Henry Ford provides broad operational talent and engineering genius, sitting half in the background, half on the stage. Charles E. Sorenson, vice-president, has been the production general of the Ford operations, translating plans into action. Harry Bennett, personnel director, has gradually emerged as a very influential personal advisor to Henry Ford. Edsel Ford was the administrative head, the commercial, sales

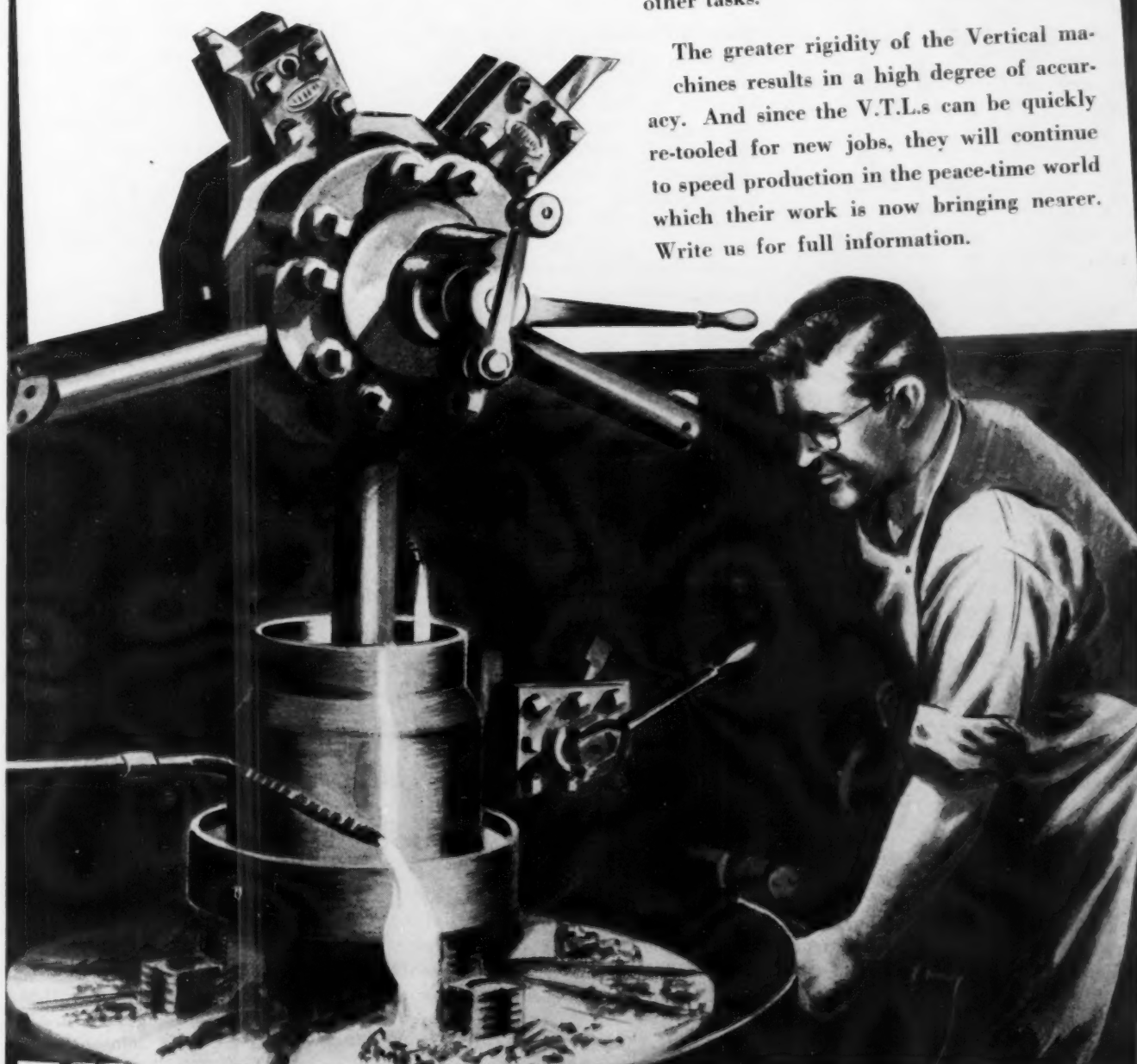
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The greater rigidity of the Vertical machines results in a high degree of accuracy. And since the V.T.L.s can be quickly re-tooled for new jobs, they will continue to speed production in the peace-time world which their work is now bringing nearer. Write us for full information.



THE BULLARD COMPANY
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HEARTS FOR TANKS: Engines of characteristic peace-time design, built by Cadillac Motor Car Div., have been used for motive power for tanks, it was revealed with the publication of Army Signal Corps photographs. Cadillac also disclosed that before its near-commercial engine was used in American tanks it was tried in Australian tanks and found eminently suitable.

and advertising administrator, and together with Sorenson represented the company in contacts with Washington and the armed services, and developed broad planning.

AS recently as two years ago, the topmost administrative group was augmented by P. E. Martin, who functioned as a production manager; A. M. Wibel, purchasing director, and John Crawford, assistant to Edsel Ford, but these men have resigned. Today, very close to the top management ranks and importantly in the picture are R. H. McCarroll, who operates in the role of a technical chief in the generally title-less Ford plants; L. S. Sheldrick, whose functions are those of a chief engineer; B. J. Craig, the company secretary, and a newly elected vice-president, and I. A. Capizzi, company attorney who has bloomed into administrative importance particularly since the auto workers' union moved into the Rouge.

None of these latterly named Ford men, nor others, have ever operated over anywhere near as broad a range as did the Henry Ford-Edsel Ford-Sorenson-Bennett group. The entire management bloc today is still rather small, considering the giant scope of the company's activities.

Some enlarging of the management pool has developed in the fairly recent past, however. Operations of the company have been tending toward a divisionalized basis, edging away from unified, centralized control. Men who until recently were without specific responsibilities, functioning somewhat fluidly on the Sorenson staff, have now been given more or less well-defined spheres of activity.

Working immediately under Sorenson is M. L. Bricker, who has assumed general watch over the aircraft pro-

gram. He handles the affairs of Willow Run, along with Logan Miller, and also has a degree of responsibility over the aircraft engine manufacturing program, which is more directly supervised by E. J. Wedge.

Reporting to Sorenson from another zone of production is Ray Rausch, who is in charge of the Rouge plant and who, in less specific terms, watches over the operations at the tank division, supervised by William Comment, and at the Lincoln division, run by J. H. Waggoner.

Purchasing, meanwhile, is in the process of divisionalizing under Howard Kellogg, formerly concerned only with engineering purchasing, and Claude Nelles, recently transferred from steel mill management. The post of sales manager, occupied by H. C. Doss, has suffered a war-induced decline in importance insofar as the company administration was concerned, one which will likely continue until civilian production returns, although its work in maintaining the dealer organization is of unquestioned importance.

Returning to the "first line" of management, its reduction from four to three is a shade more complicated than just that. Henry Ford, nearly 80, is practically as active as ever, but the strain of war production is a severe one for any constitution to withstand without pause. Husky Charles Sorenson has been ill this past winter, proving the strain of the program, and adding to the top management problems of recent months.

SPECULATION can run rampant in Detroit, therefore, as to the direction of "first line" management of the Ford affairs from here forward. Corner conversation brings up the possibility that company attorney

Capizzi may move more onto the administrative side, away from the advisory and legal sphere. The thought is advanced, too, that Ernest Kanzler, brother-in-law of Edsel Ford and once connected with the company, may return to it, to fill part of the administrative gap left by Edsel Ford's death.

There is a third generation of Fords, true, but all three sons are

An outline of the Ford organization as it then existed was carried in THE IRON AGE of June 20, 1940, on page 86.

in the armed services. Only one of them, Benson Ford, has had any experience of note with the operations of the company plants, and his tenure was short.

This is necessarily speculation. There are no concrete clues, nor are there likely to be any; the events which occur will speak for themselves. Ford developments ahead will likely be born largely of two factors, the desires of Henry Ford, which are unlikely to be communicated with advance notice, and, less certainly, the feelings of the government. This latter consideration stems from the fact that the Treasury Department may be able, within the bounds of its authority, to so complicate and enlarge the tax problem that the gigantic Rouge plant might ultimately fall into its hands or be opened to public ownership. In the other direction, the Treasury can so simplify the estate tax matter that company control will be tranquilly undisturbed.

One faint remark made more than a year ago may be magnified into a straw. It came from someone very close to Ford affairs, who was undoubtedly thinking of the Ford situation when he spoke. He said: "The days when fortunes pass down in families are fast coming to an end."

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Washington . . .

L. W. MOFFETT

•Study of extravagance shows WPB spent \$1.3 million for telephone calls in six months and ran up traveling expenses of \$1 million in same length of time, including \$800,834 for airplane travel ... Immediate action by Congress asked to effect drastic slash.



WASHINGTON—The shocking extravagance of bureaucracy repeatedly has been exposed by Congressional committees. But seldom if ever has there been a more startling exposé than that issued last week by the Joint Committee on Reduction of Nonessential Federal Expenditures. This committee, headed by Senator Byrd, Democrat of Virginia, made an inquiry into the traveling, telephone and telegraph expenses of Government agencies, exclusive of the War and Navy Departments. The committee reported that, based on an investigation for a six-month period, it is possible that these expenses will reach \$100,000,000 a year! A graphic idea of the inflation in communication services is obtained by the report which says that during the entire fiscal year 1941 the expenses for this service for the executive establishments of the Government totaled \$14,805,993, and that is a lot of wordage.

By far the outstanding squanderer of the taxpayers' money for verbose phone talk is the WPB. During the six-month period between July 1, 1942, and Jan. 1, 1943, the WPB telephone expenses were \$1,346,093, believe it or not. This was 17 per cent of the total telephone cost of departments whose bills exceeded \$100,000.

"The tremendous proportions of this figure may best be judged," said the committee report, "when one realizes that for the same cost (long distance calls on the average night

rate basis) at Government rates, the WPB could put in hourly 3-minute telephone calls to the moon, 221,463 miles away, every hour in the day, every day in the year." One is inclined to think that if there was a hookup, WPB would have frequent chats with the man in the moon.

WPB also did the most traveling, a great deal of which, it is suspected, was junketeering. For this category WPB billed John Q. Taxpayer for \$1,029,387. WPB was first in airplane expenditures amounting to \$800,834.

The OWI was the Abou ben Adhem (may its tribe decrease) in all communication expenditures. This agency, which, like most of the almost numberless Government set-ups, is greatly over-staffed, tossed in a total of \$1,812,061.78 for its six-month wordage. Away out in the lead for special-service costs, it expended \$1,104,684 for these purposes.

IT'S a tall figure but in view of the splendid work FBI is doing there won't be any quarrel with the fact that the Department of Justice was

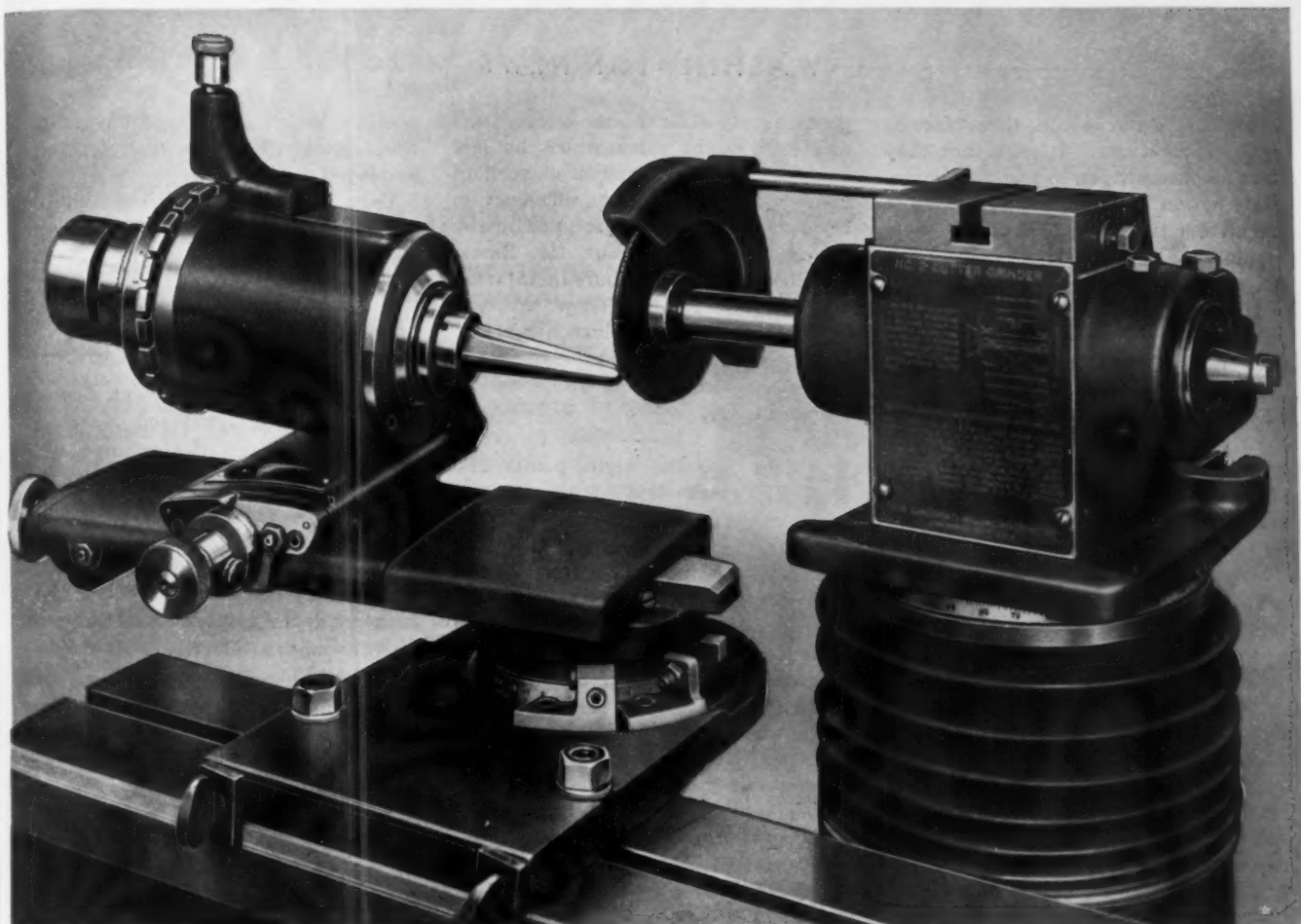
out in front in estimated traveling expenditures for the fiscal year 1943 of \$6,869,996. But it's not possible to believe that the high expenditures for these purposes are at all justified by some other agencies, such as those of the Department of Labor, estimated at \$2,053,945, a 46 per cent increase over 1941; the Treasury Department, estimated at \$5,343,382, a 27 per cent increase; the Department of Interior, estimated at \$2,917,360, which, however, is only a 1 per cent increase; and the ambitious Board of Economic Warfare, \$634,574, which from a point of percentage outstripped other government agencies many times in the rise in traveling costs. It raised its ante by 2466 per cent.

And so on, far into bureaucracy's stratosphere of extravagance and its indifference to piling additional tonnage to the load of the taxpayer. This is the same taxpayer who is deluged with smug lectures from Washington on the necessity of economizing and sacrificing for the sake of the war effort. It would be well if these lectures were reversed.

The Byrd Committee was warm

PEARL HARBOR WRECKAGE: Three veterans of South Pacific warfare examine the wreckage of naval ships from Pearl Harbor at the Pittsburgh Works of Columbia Steel Co., Pittsburgh, Calif. Left to right they are: Reginald Tiller, Machinist Mate first class, U. S. Coast Guard; Corporal George Arm, U.S.M.C.; and Signalman second class Jack Warner, U.S.N.





Now YOU CAN SHARPEN BALL-NOSE AND DIE-SINKING CUTTERS On Your Plain Cutter Grinder.

TO the long list of cutters which can be quickly and accurately sharpened on your CINCINNATI No. 2 Cutter and Tool Grinder, add: die-sinking and ball-nose cutters; double-end cutters; tracer fingers. Work of this type may now be handled with the aid of the CINCINNATI No. 1 Radius Grinding Attachment.

These brief specifications give you an idea of the suitability of the attachment for grinding cutters in your shop:

Capacity, ball-nose cutter.....	3" diameter
Will grind radii of.....	0 to 1 1/2"
Swivel range.....	360 degrees
Taper in spindle.....	No. 5 Morse
Capacity with collets for straight shank cutters.....	1/8" to 1 1/4"
Spindle speed when motor driven.....	237 r.p.m.
Index plate has 24 notches.	



CINCINNATI No. 2 Cutter and Tool Grinder. Complete description and engineering specifications for these machines, in addition to data on attachments, may be obtained by writing for catalog M-962-1.

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under the collar about these inordinate expenditures. It said that they "are so excessive as to warrant immediate action by Congress." The most effective action and it should be taken, would be a drastic slash in appropriations. Further there should be a complete lopping off of many bureaus, whose time is spent in activities that only heckle industry and slow down the war effort. The gross overlapping of bureaus for one thing would be done away with, and Government costs cut, an important thing to the taxpayer, even if it isn't to the bureaucrats. The war machine would be made more mobile and effective. Then many payrollers could serve much better either in production plants or on the farm.

CUTTING them off from the Treasury gravy is the only way to curb the bureaucrats from insatiable appetite for power with resulting waste of money. They have no conception of the principle that public office is a public trust. They scorn mere admonitions from Congress as has been observed by Representative Robert Ramspeck, Democrat of Georgia, Chairman of the House Committee on Civil Service. In a recent talk before the Council of Personnel Administration, Mr. Rams-

peck sharply attacked the bureaucrats and cited eight rules which he laid down for them. They are excellent rules and if followed the efficiency in Government would be stepped up by a high percentage. But, Mr. Ramspeck pointed out, the bureaucrats are not obeying rules. They will not either until they are given a realistic lesson — slashed appropriations — rather than lectures, as wholesome as the latter are.

HERE are the eight points Mr. Ramspeck laid down to the bureaucrats for good government:

That no person should be employed whose appointment is opposed by a majority of the people.

No person should be empowered to write regulations unless he has had practical experience in dealing with people.

The Government employee who deals with the public must have tact, understanding and he must be aware that he's a servant of the public.

No person should be retained on the payroll if he isn't needed.

No incompetent person should be kept on the payroll.

No employee should be retained who fails to do a full day's work each day.

No person should be placed in a

position where he can do favors for those with whom he was formerly employed, and

Care should be exercised that no favoritism is shown in fixing pay or awarding promotions.

Pressed Metal Institute Announces Aims and Officers

• • • The objectives of the Pressed Metal Institute, organized March 17 by representatives of sheet and strip metal fabricators, rolling mills and metal press manufacturers, were announced recently by George E. Whitlock, president. The Institute will co-operate closely with appropriate Government departments to speed up and increase mass production of war materials, and it will engage in research to develop new and extended uses for metal stampings in the post-war period.

In addition to its administrative offices at 19 West 44th Street, New York, the Institute has established an office at Press Building, 14th and F Streets, N.W., Washington.

Officers of the Institute are: George E. Whitlock, Salem, Ohio, president; S. J. Menzel, Detroit, vice-president; H. L. Moody, New York, secretary-treasurer and managing director. Members of the Board of Trustees are: Frank E. Graper, Toledo; W. W. Galbreath, Alliance, Ohio; J. H. Robins, Philadelphia; G. F. Ahlbrandt, Middletown, Ohio; William H. Miller, Utica, N. Y.; W. E. Porter, East Boston, Mass.; R. W. Glasner, Chicago; G. H. Roberts, Detroit; William J. Meinel, Philadelphia; W. C. DeMaris, Philadelphia; Roy C. Ingersoll, Chicago; Stephen J. Menzel, Detroit; George E. Whitlock, Salem, Ohio; I. R. Morris, Cleveland; K. T. Norris, Los Angeles.

Steel Bookings for April 73 Per Cent Over March

• • • Bookings of fabricated structural steel for the month of April, amounting to 56,050 tons, were 73 per cent greater than the bookings for the previous month, according to reports received by the American Institute of Steel Construction. Bookings for the first four months of the year totaled 198,471 tons, compared with 974,347 tons for the corresponding months of 1942. Shipments declined from 113,337 tons in March to 97,982 tons in April. The four months shipments totaled 430,303 tons or approximately 40 per cent less than the 710,816 tons shipped in the corresponding period of 1942.

The backlog of tonnage available for future fabrication as of April 30 is 385,294 tons.

THE BULL OF THE WOODS

BY J. R. WILLIAMS



CARBIDE TOOL

Service Beyond the Sale!

TO HELP FURTHER INCREASE WAR PRODUCTION

★ CARBIDE TOOL TRAINING COURSE

To help carbide users in war industries speed the training of new men, apprentices, and those being converted to carbide tool use in the metal working trades, Carboloy Company operates an instruction course at its Detroit plant for the training of carbide users' key men. These men receive one week's training in the fundamentals of design, brazing, application and maintenance of carbide tools, through actual shop practice, discussion periods, and training film showings. The men return to their own plants with a basic knowledge of carbide practice—and recommended procedure for training their own men, assisted, when desired, by our field engineers.

During the two years in which this training course has operated, carbide users in 39 states and 3 allied countries have received this training. The course is operated without charge as a service to war industries. A similar service is available to cartridge case die users—to instruct in the finishing and servicing of carbide dies for drawing cartridge cases.



★ TRAINING FILMS

To help in the gigantic task placed upon industry and government, of training new thousands of workers, a set of six carbide training films—as described below—was made available by Carboloy to industry last fall—to provide detailed training in all phases of carbide tool use. (Booklet GT-151.)

- Film—"WHAT IS CEMENTED CARBIDE?"
- Film—"DESIGNING CARBOLOY TOOLS"
- Film—"BRAZING CARBOLOY TOOLS"
- Film—"CHIP BREAKERS"
- Film—"GRINDING CARBOLOY TOOLS"
- Film—"PUTTING CARBOLOY TOOLS TO WORK"



These six films are available at approximate print cost

★ FIELD SERVICE

Since the day cemented carbide was first introduced—as a new, strange, "revolutionary" tool material—Carboloy has maintained a large, active staff of experienced field engineers to assist users in all phases of carbide tool practice. As an example of the type of service these men render, in one year alone they trained more than 5,000 men in users' plants in the correct methods of rapid carbide tool grinding.



★ SPECIALLY DEVELOPED GRINDING EQUIPMENT

Special carbide grinding equipment developed by Carboloy Company in co-operation with machine builders, plus special rapid grinding technique, conserves carbides, reduces down time on thousands of vital war jobs. (Cat. GT-141.)



★ NEW CHIP BREAKER GRINDER

New!—Improved type of grinder for grinding chip breakers in carbide steel cutting tools, including roller turner tools. Sturdier, larger table, high and low speed table travel. Also adaptable to grinding precision boring tools and flat form tools. (Left.)

★ RESEARCH AND DEVELOPMENT

A special committee on research and development functions at Carboloy to constantly improve present methods and develop new methods, new materials for the future. The work of the men on this committee—headed by Dr. Zay Jeffries, metallurgist and Chairman of the Board of Directors of Carboloy Company—has resulted in many outstanding contributions now helping to further speed war production through carbide usage. This committee will continue its efforts to advance the art in the days of peace as well.

★ ENGINEERING ARTICLES IN THE TECHNICAL PRESS

Through frequent articles in technical magazines Carboloy engineers disseminate information on current phases of carbide use important to war industries. Milling with carbides, machining cast armor plate, renewing worn high speed steel tools, are a few of the many subjects covered in the past 12 months.

★ INSTRUCTIONAL LITERATURE

Each year Carboloy publishes comprehensive engineering bulletins covering latest carbide practice. Current booklets include D-113-R—finishing and servicing cartridge case dies—GT-133—carbide tool manual of design, brazing, grinding, application—GT-127—grinding carbide end cutting tools.



CARBOLOY COMPANY, INC., 11153 E. 8 MILE AVE., DETROIT, MICHIGAN

Sole makers of the Carboloy brand of cemented carbides

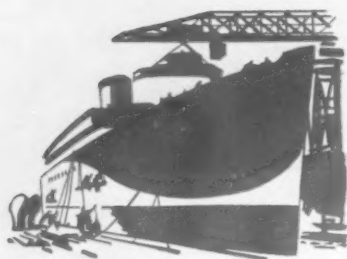
Birmingham, Ala. • Chicago • Cleveland • Los Angeles • Newark • Philadelphia • Pittsburgh • Seattle

Canadian Distributor: Canadian General Electric Co., Ltd., Toronto, Canada

CARBOLOY CEMENTED CARBIDES

TOOLS • DIES • DRESSERS • MASONRY DRILLS • WEAR RESISTANT PARTS

• Small Southern California businesses hit by labor shortage, study job classification, incentive plans . . . Ninety per cent have war contracts.



LOS ANGELES—Always a friendly, folksy metropolis, this City of Angels until recently always had considered workers as first name personalities fitting into a general co-operative production scheme, and seldom analyzed individual functions performed.

Not until manpower shortage splashed like a 6 a. m. cold shower over plants mushroomed from obscurity did the great bulk of management here awake to the meaning of such terms as "job classification," and "production study."

With the advent of restrictive government controls upon hiring and wages, and with heavy inroads being made by selective service upon the comparatively young workers so common to the aircraft and tributary industries, interest of management has suddenly snuggled up to possibilities inherent in job studies and, ultimately, wage incentive plans.

So deeply entrenched in war work are the smaller manufacturing plants in southern California that when Smaller War Plants Corp. hung out its own shingle in Los Angeles a fortnight ago, a letter announcing that stranded plants might find solace with the little business agency brought brought only 163 replies from a total mailing of 4,956 southern California plants, a cool three per cent. This was sufficient warning to the local staff of 21 that its members would have to search the alleys and byways in order to drum up trade, inasmuch as a plant must run

at less than two-thirds of normal capacity to come under the wing of the SWPC. In March, for instance, 183 plants, none of them employing more than 500 workers, came within a hair of hitting the \$700,000 figure in total new aircraft parts contracts. WPB estimates that nearly 90 per cent of qualified small manufacturers here have gone into war production.

The two smallest contracts call for welding in a two-man shop and for aircraft tools from a five employee plant.

THE contrast of all-out war production in the smaller plants here as compared to some of the communities of the Eastern seaboard may be attributed to the fact that southern California never had to undergo the travail of being "converted" to war production. Much of that busy segment of the aircraft industry now known as "little business" now is turning out its production in plants built on sites which three or four years ago were cabbage patches, and its very *raison d'être* is the war.

As Watt Moreland, WPB production services chief here, says, "unlike Detroit which already had an enormous peace-time auto industry, southern California had no vast civilian plants to remodel. That meant there were no shut-downs while production lines were rebuilt. Instead, the airplane plants which formed the bulk of industry here simply drew in hundreds of small firms as subcontractors, and themselves became largely assembly plants for parts and components produced in smaller shops throughout this area.

This tributary status of the small plants to the big airframe assembling units has brought trouble from the beginning. Federal agencies tended to toss these little fellows—and some of them are no longer so very little—into the same basket as the prime airframe contractors. This difficulty culminated in the recent airframe wage stabilization case, when the so-called parts manufacturers objected to the report made by Paul R. Porter, special War Labor Board representative, which placed many of their workers in the airframe category despite pronounced differences in the nature of jobs and

problems encountered in the two types of plants.

TO support the contention that the parts manufacturers' job problems are different, this week the Aircraft Parts Manufacturers Association is publishing a job dictionary for the parts industry. The association, in compiling this cold-blooded analysis of work performed by its employees, called in Dr. Vernon D. Keeler of the University of California at Los Angeles faculty. Dr. Keeler looked into the working habits of the parts manufacturers' employees and came up with the statement that "the skill, training and experience required in the machine tool industry and in the aircraft parts industry appear in many instances to be greater than that required for the airframe industry, due to the closer tolerances in the aircraft parts industry and the nature of the particular industrial operations." If that statement had come to light four months ago, it would have been good ammunition for proponents of a higher wage scale for the parts makers, putting them in a favorable position to compete for labor with the big airframe assemblers.

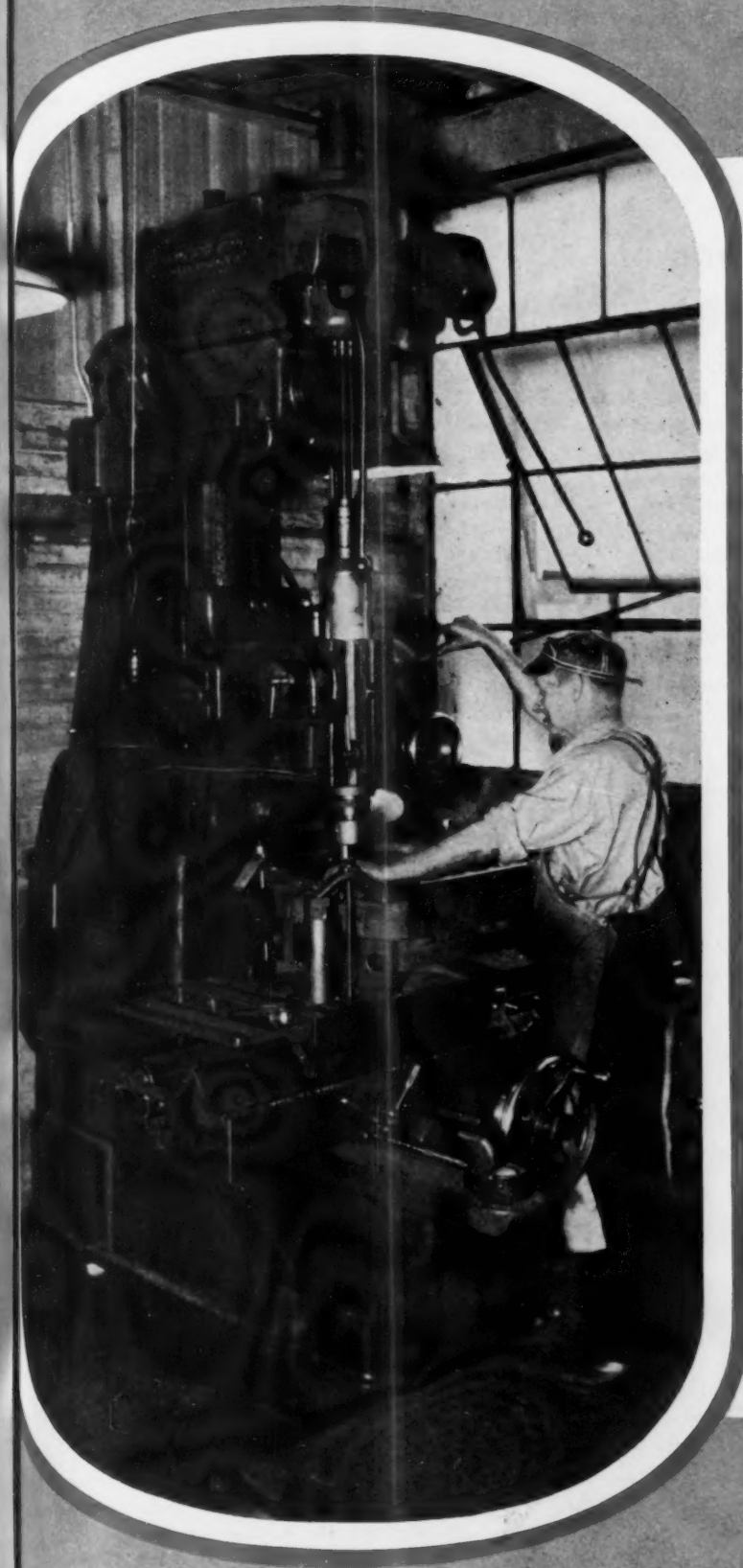
The dictionary compiled by the association contains approximately 300 job descriptions and accompanying evaluations, and will serve a standard for hiring, upgrading, establishing uniform wage rates throughout a plant, in negotiations with labor organizations, and, last but not least, in presenting wage alteration requests to the War Labor Board.

The strong local interest in wage incentives among local plants was summarized recently by Ben L. Wells, whose business is advising on management problems. As Wells puts it, "Management's primary interest in wage incentives is shifting from a lower cost per unit to increased production per employee. This is now important because of the dwindling supply of employees available to produce greater output than ever before needed."

San Francisco last week was declared by War Manpower Commission to be an area of acute labor shortage, resulting in a compulsory

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JIG BORER



combines flexibility
and accuracy on a
wide range of operations

● The flexibility of this machine comes from practical design and construction which provides exceptional ease of set up and quick change over from one job to another.



Simplicity of operation makes it easy for ordinary shop labor to obtain particularly close tolerance work without special training.

Being used extensively in Tool & Die Shops throughout the nation Fosdick Jig Borers are meeting the needs of precision production of tools—dies—and jigs so essential to our war program.

For the tool room—for the production shop—this machine is adaptable to both types of operation and requires only a moderate investment.

Thus the Fosdick Jig Borer offers the utmost in versatility plus dependable accuracy on both small lots and quantity production. Fosdick Jig Borers are helping to meet rigid production schedules in hundreds of War plants and at costs that are surprisingly low.

Put your next jig borer job on a Fosdick—for speed—for precision and for economy.

THE MANY ADVANTAGES
and mechanical details of Fosdick Jig Borers
are fully explained in our bulletin J.B.I.

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FOSDICK

MACHINE TOOL COMPANY
CINCINNATI . . . OHIO

universal 48-hr. work week, severe restrictions on hiring, and a threat that future Federal contracts will be by-passed to communities whose industrial nose is farther from the grindstone. As this is written, the vocal forces of Los Angeles commerce are barking loudly against any such action affecting this part of the state but it remains to be seen whether they have raised up on their

hind legs fast enough to keep their tail from getting caught in the door.

If southern California becomes officially a Group I labor shortage area, with accompanying restrictions, the old fixed wage structures will begin peeling off like Santa Monica Memorial Day sunburn, leaving a fresh tissue of incentive wage plans over plants which thought the wage question was settled for the duration.

Instructions for Extension of 48-Hr. Week in Steel Are Issued

Washington

• • • The new attack on the rights of management was launched by the Government Tuesday with the issuance of instructions providing for the extension of the 48-hr. week to all branches of the steel industry. The instructions provide that WMC Regional Directors shall consult with representatives of organized labor before granting temporary exemptions from the 48-hr. order of May 1.

The instructions require that workers released under WMC Order 8 in plants which could not obtain a minimum 48-hr. work week by July 1 must be released by Aug. 1, except in extraordinary cases requiring special approval.

The exemptions which regional directors are authorized to grant are temporary and only in facilities where failure to adopt the minimum war time work week of 48 hr. is due to production requirements, WPB Steel Division directives or the allocation of materials or other reasons beyond the control of the employer. The requirements that the regional director must consult with the union repre-

sentatives is a unique granting to labor of power in something which is ordinarily a management problem.

Workers and jobs exempted from the maximum hour provisions of the Fair Labor Standards Act, office and clerical workers of executive, sales and administrative offices and distinguished from general mill offices are exempted so long as work is not generally available to these workers upon their release.

The WMC instructions, though they postpone enforcement of the 48 hr. edict and provide machinery for application for exemptions from the order, are both considered by observers as complete labor victory. The additional working hours will not increase steel production, steel officials maintain, inasmuch as the industry's steel making units operate continuously, and in isolated cases where the 48 hr. week has already been instituted there has not been any release of workers.

The union argument that working crews' experience has been diluted by the hiring of additional "green" workers and that the industry cannot maintain an increased production

without increasing hours is not supported by trade sources. Steel executives argue that the dilution of experienced workers will be aggravated by the release of so many as 50,000 employes which the union claims.

Moreover, if regional directors are unduly influenced by labor protests, steel companies as the order stands will have to pay workmen for time in which they do not work in rolling facilities which are subject to the exemption provisions. Morale is not expected to be lifted if workers do not have enough to do in their working hours and the prediction that steel production may suffer as a result may come about.

Federal Grand Jury Indicts Carnegie-Illinois

Pittsburgh

• • • Carnegie-Illinois Steel Corp. was indicted here last week by a Federal Grand Jury for "concealing" and "destroying" records pertinent to the Truman investigation on the sale of alleged sub-standard steel plates to war agencies. The Grand Jury investigation was the result of a previous Truman Committee hearing on the subject.

Although the same Grand Jury recommended that two bills be voted against four metallurgical officials of the company, the Grand Jury reversed itself on the final voting and dropped charges against these men.

Under court regulations indictments can be obtained only if twelve jurors approve, but recommendations require only a bare majority of the sitting jurors.

J. L. Perry, president of Carnegie-Illinois Steel Corp., insisted that "if any concealment or destruction of records occurred, it was done without the knowledge or approval of the management of the Carnegie-Illinois Steel Corp."

The Grand Jury has reconvened again this week to take up other phases of the investigation.

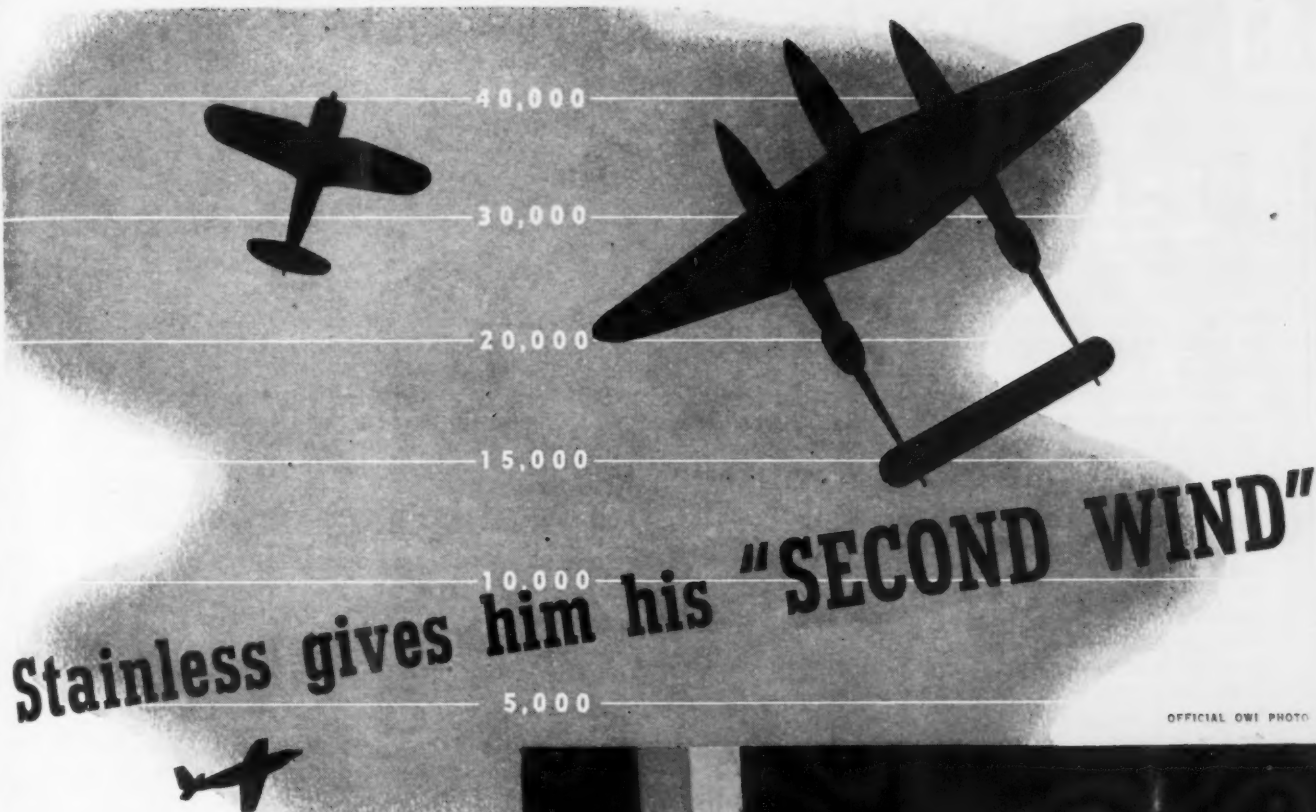
Depots for Pipe Planned

Washington

• • • Fourteen oil-country tubular goods depots will be established throughout the United States by the third quarter of 1943 to meet emergency needs of wildcat operators, Harold L. Ickes, Petroleum Administrator for War, announced May 25. Location of the depots has not been definitely determined.

WOMEN ANALYSTS: Manpower shortage is the reason these women are being trained as analysts in the laboratories of the Oliver Iron Mining Co., U. S. Steel Corp. subsidiary.





OFFICIAL OWI PHOTO

When a sky fighter is soaring 15,000 feet up, normal breathing is impossible. The air becomes rarefied, thinner and thinner. He must get his "second wind"—at least 50 per cent pure oxygen.

Oxygen tanks with their tubes and masks are standard equipment for our high-altitude fighter pilots and bomber crews. Many of the vital cylinders are made of ARMCO Stainless Steels.

These tough, durable metals take this job in stride. All cylinders are factory-tested at 700 pounds hydraulic pressure—almost twice as much pressure as is exerted by an average tank of oxygen. Before the containers are filled with oxygen and sealed, hot dry air is forced through to remove all traces of moisture.

Now and then a cylinder is taken from the production line for a ballistic test. The metal must not shatter into death-dealing shrapnel when a bullet pierces the surface.

ARMCO Stainless Steels are used in oxygen tanks because they assure strength, lightness and corrosion resistance. Do these qualities of ARMCO Stainless suggest new designs for your future peace-time products? Write us for information on rustless metals. Just address The American Rolling Mill Co., 1451 Curtis St., Middletown, O.



THE AMERICAN ROLLING MILL COMPANY



Fatigue Cracks . . .

A. H. DIX

Gripe

• • • Among the things that annoy us is the fashioning of bouquets out of war stamps. The use of money, or its representatives, for decorative purposes strikes us as bad taste, like lighting a cigar with a \$5 bill. Worse still, by encouraging the wearing of war stamps as corsages and boutonnieres the Treasury Department is indulging in the dangerous practice of cheapening its product.

But then, the Rube Goldberg cartoons now seem to us to be painfully labored instead of funny, so maybe it's just a digestive disorder.

Guessing Game

• • • While on a sour note we would like to protest against the editorial practice of inadequately captioning photographs showing A receiving a medal, plaque or something else from B. Too often the caption fails to say which one is A, so the reader has to guess whether A looks happy because he is about to get something or because he is a cheerful giver.

If the gift is a certificate, the photographer usually requires both parties to get a tug-of-war grip on it, and it is hard to say which one is about to get permanent possession. For instance, the week before last the editors ran a photo showing Robert W. Wolcott, head of Lukens Steel, being congratulated by Ralph A. Bard, Assistant Secretary of the Navy, on Lukens' low absentee record. We don't know either one from Adam and we will probably die wondering which is the one with the fine head of hair.

Lower Case Democracy

• • • We are happy to say that we are not those whose gastric juices cease to flow whenever their names are misspelled. Your favorite family journal has been called everything from the "R & H" to the Yarn Age, and answers to all names, although our favorite is "The Ironaide," which we were called lately.

Bernard L. Herman, tall, suave and able business ambassador of this journal in the Philadelphia area, said that at a recent meeting he was asked why our name begins with "The." He tells us that he said the definite article "carries considerable weight in this instance." But why it carries considerable weight he doesn't say. So we have to go right on thinking it makes no difference one way or the other, and that you would love your favorite family journal just as passionately with a lower case "t" as with an upper case "T."

Some firms that use the capitalized definite article as part of their corporate titles are quite fussy about it, and the brains department could easily spend half its time sorting out the little "t's" from the big "T's." But it avoids that trouble by the simple process of giving no one a "The"—except your favorite family journal.

Marvels in Plural

• • • Speaking of names, we always thought that the Selas Co., maker of gas systems, etc., was started by a man named Selas, and that it was pronounced *sell'-us*. Instead, it is pronounced *seal'-us*, and is simply the plural of "Selah," a Far Eastern expression meaning "Lo and behold!"

Incidentally, we hear that the first wall decoration Selas put up in its handsome new metallurgical laboratory in Philadelphia was the big NE steel chart you got with the May 6 issue.

This is as good a time as any to report that our make-up editor always says "Lord and behold."

Perfect Score

In the May 13 "Fatigue Cracks" you ask for the address of Philip B. Wallace. It is 249 First St., San Francisco.

—J. E. Shearer, Production Manager,
Hanford Foundry Co.

That makes our batting average 1.000 in getting answers to broadcast pleas for missing addresses. The power of this particular segment of the press awes us, and we wonder less and less about the mistake a recent caller made in thinking we conducted the "Port of Missing Heirs" radio program.

Aptronym

I quote from a recent issue of the Newark Evening News:

Al Herring, president of Seaside Fish Co., said . . .
—Dr. A. Seligman,
Newark, N. J.

By Any Other Name

• • • A month or so ago *Printers' Ink* editorialized:

. . . could we get a new word for "capitalism"—a new phrase for "the American Way"—a new phrase for "free enterprise?" Somehow we have a feeling, when we use these phrases that they don't mean exactly the same thing to all people.

Paul Hoffman, Studebaker's chief, and head of the Committee for Economic Development, echoed the same thought in a talk we heard him give last week. He said specifically that he doesn't like the phrase "the American system of free enterprise." He says further:

"Both business and government must make every effort to see that competition is put back into the competitive system—to the fullest extent possible."

We don't see that new names need be invented. "Free competition" still covers the situation very well. The others are merely euphemisms coined for sensitive ears. Free competition may not cure all our economic ills, but if left alone it can be depended upon to do a neat surgical job of cutting out boils, blackheads, warts, wens, cysts and other evidences of economic high living. If the victim is far gone with corporate arteriosclerosis, no cries for mercy will deter competition from administering the black pill. Thus will the business community be kept clear of cripples.

Birth Announcement

• • • Nine weeks ago the brains department conceived a new feature. The period of gestation for editorial features is five weeks, and as birth was normal, the baby is now four weeks old. But in keeping with approved journalistic practice it has been permitted to live through its awkward weaning and creeping period screened from your critical eyes. Now that it has learned to stand strongly on its own legs it makes its bow to you this week on page 45.

The whole staff helped name it. Of more than 250 titles, ranging from a staid "Signs and Portents" to a hepeattish "What's Buzzin', Cousin," the judges selected "News Front" as pat and pleasant.

We think you will rapidly grow fond of the baby and that before long it will be one of your favorites.

Stopper

. . . They Thanked the Lord We Had the Pumps—O'Brien Machinery Co.
. . . No pits . . . no burns . . . no errors!—Westinghouse.

Puzzle

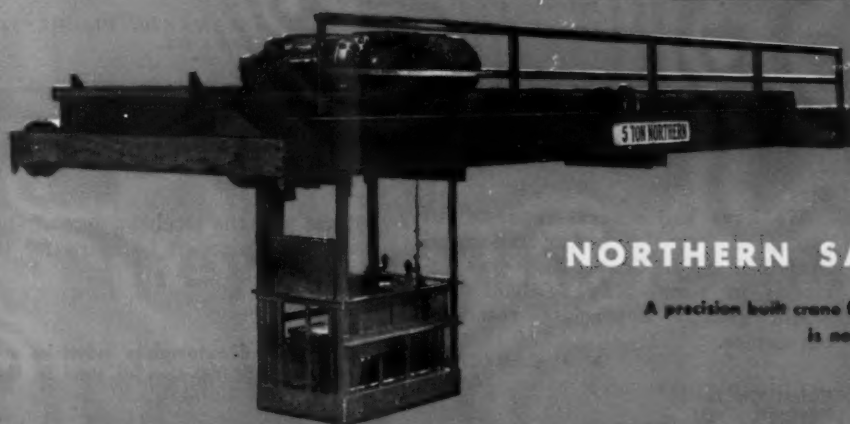
This trifle should take you only 32 seconds:
A hunter with a gun 1.7 yards long is told that he may not ship it in a baggage car because of a ruling forbidding the shipping of any article whose greatest dimension exceeds 1 yard. What should the hunter do to ship the gun?

3 LINES OF *Northern* CRANES



NORTHERN SUPER-CRANE

The fine machine tool of overhead cranes built for heavy duty, 24-hour-a-day jobs.



NORTHERN SA & LSA CRANE

A precision built crane for medium duty where service is not so severe.



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Consists of a Northern Hi-Lift Hoist applied to an overhead girder. Available in hand travel or motor travel.

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All Northern Cranes are built to the most modern standards — are especially sturdy, durable, and have the most modern electrical equipment and control. Trolleys are one-piece welded construction. Gears are precision machine cut, and run in an oil bath. Ground shafts operate in oversize roller bearings. Construction is right throughout.

A Northern Crane, properly selected for the job, will give long, satisfactory service.

Write for booklet.

Dear Editor:

PLASTIC PUNCHES

Sir:

Your Oct. 1, 1942 issue has an article on the use of plastics in drop hammer work. I quote from it, "Plastics are being substituted for lead in punches used in combination with Kirksite dies for drop hammer work. Since the plastic is more resilient, it does not batter out of shape as quickly as lead."

We would like to obtain detailed information as to the ways in which plastics are being used, and we shall appreciate it if you will send us names and addresses of the firms you had in mind when you wrote the article.

A. A. BAUDAT,
Equipment Engineer

Boeing Aircraft of Canada, Ltd.,
Vancouver, B. C.

● For detailed information see "Plastic Punches for Aircraft Sheet Metal Parts," in the Feb. 18, 1943, issue. This article is based on practice at Vega Aircraft Corp., Glendale, Calif. The plastic material used by Vega is made by the Plastalloy Co., Burbank, Calif.—Ed.

FLAME PRIMING

Sir:

We refer to two articles entitled "Flame Priming Method of Preparing Steel Surfaces," authorship of E. W. Deck of Linde Air Products Co., and published in the Oct. 22 and Oct. 29, 1942 issues of THE IRON AGE. We are very much interested in the subject and wish to contact the author, but are not informed of his address.

W. J. CHALMERS,
Technical Supervisor

Drynamels, Ltd.,
Birmingham, England

● The address is 30 East 60th St., New York City.—Ed.

CUTTING TOOLS' BEGINNING

Sir:

REQUIRE INFORMATION ESTABLISHING DATE OR PERIOD CUTTING TOOLS FIRST USED ON FERROUS METALS. NEED THIS FOR PAPER ON METAL CUTTING TOOLS TO BE READ MAY 27. IF YOU CAN SUPPLY REFERENCES PLEASE WIRE INFORMATION COLLECT.

P. O. GIBSON

Kokomo Machine Co.,
Kokomo, Ind.

● Hammers, hand chisels and files have been used as far back as the Middle Ages for working ferrous metals, and even before that on bronze.

Cutting of metals with power-driven machinery dates back to the 18th century. Watt's famous steam engine, which used a condenser for the first time, was made possible by the invention of a boring machine by John Wilkinson, of Bersham, England, in 1774. Watt had actually conceived his invention in 1765, but could not produce a working model until Wilkinson showed him

how the cylinder could be bored sufficiently accurately to make a steam-tight fit with the piston. Another boring machine for cannon, built some years before was entirely too crude for the purpose.

If you want to go back to the earliest conceptions, you could include the work of the indefatigable Leonardo da Vinci, who in the 15th century sketched many cutting machines embodying modern principles, although badly out of proportion, but we believe none of these cutting machines was built.—Ed.

NE STEEL CHART

Sir:

Please forward new NE Standard Steel Chart. Have seen it in one of my plants. It is a reflection of the wonderful work you are doing in the war effort.

FRANK S. SPLATT,
Senior Inspector of
Naval Material, U.S.N.

Quaker City Iron Wks.,
Philadelphia

Sir:

We have had several requests for copies of THE IRON AGE NE Steel Standard Steel Chart that was included in your May 6 issue. We would greatly appreciate receiving ten copies.

M. F. GARTON,
Buyer

Kaiser Co. Inc.,
Fontana, Calif.

Sir:

We have received one copy of the Standard Steel Chart, dated May 6, and wish to compliment you on this setup. We could use 12 additional copies to advantage.

WM. MILLER,
District Sales Manager

Jones & Laughlin Steel Corp.,
Detroit, Mich.

Sir:

The chart is of considerable interest to many of the people here at the plant, and I am wondering if it would be possible to purchase some of them.

T. W. ALDER

Barber-Colman Co.,
Rockford, Ill.

● Copies are available for 25c in stamps.—Ed.

CARBON FOR ALLOY STEEL

Sir:

Would it be possible to obtain reprints of the article by A. S. Jameson in your May 13 issue on the replacement of alloy steel by carbon steel? This is the most interesting I have read on this particular subject, and will be of considerable assistance in helping our customers transfer from alloy to carbon steel.

R. W. SHAW, JR.,
Secretary-Treasurer

A. R. Purdy Co., Inc.,
790 Greenwich St.,
New York

TOOL STEEL DIRECTORY

Sir:

Kindly send us three copies of your booklet, "Directory of Tool Steels and Other Metal Cutting Materials," by T. W. Lippert. This booklet would be a great help to us in our Tool Shop as we use many different kinds of steel each day.

N. E. SACHA,
Supervisor

Atlas Powder Co.,
Apco, Ohio

Sir:

I am a heat treater and want to know everything I can about the heat treating business. I have heard that you have a book which I am interested in. The name of it is "Directory of Tool Steels and Other Metal Cutting Materials." Will you be so kind as to let me know if there is any charge for the book. If there is, what is it?

ARMANDO FISCHETTI

1816 White Plains Rd.,
Bronx, N. Y.

● The price is 25c a copy.—Ed.

AIRCRAFT STEEL

Sir:

What was the total tonnage of steel used in the aircraft industry for the year 1942?

B. H. GOWEN

E. Corey & Co.,
Portland, Me.

● Aircraft and automobile industries used a total of 3,598,000 tons of steel in 1942. The aircraft industry alone used 560,918 tons in 1941. Censorship regulations forbid segregating aircraft tonnage for 1942.—Ed.

WELDED TUBING

Sir:

About six months ago you published an article about the automatic welding of tubes from roll stock, the thickness of the material being approximately .011 in. and about 2 in. in dia. We have lost track of the magazine. In what issue did it appear?

L. W. HILLS

Hills Bros. Coffee, Inc.,
2 Harrison St.,
San Francisco, Cal.

● Sept. 17, 1942, page 55.—Ed.

CMP-PRIORITIES GUIDE

Sir:

Just heard of the fine CMP and Priorities Guide your organization has published and would appreciate your sending 20 or 30 copies so that we can distribute them among the members of the Milwaukee Priorities Association. You can be sure that the Guide will be of value to this Association.

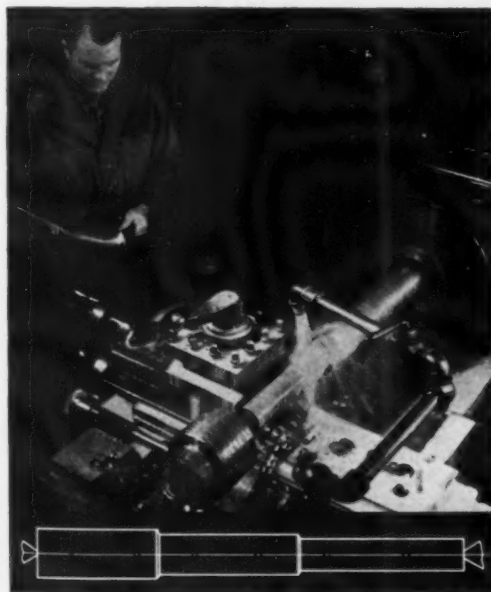
F. E. LYONS,
Secretary & Treasurer

Milwaukee Priorities Assn.,
2419 S. 60th St.,
Milwaukee, Wis.

● The prices are 25c each in quantities of 1 to 10, 20c for 10 to 25, and 18c each for quantities over 25.—Ed.



They cut turning time in half!



Monarch lathe, equipped with automatic sizing, turns these shafts *automatically*. Similarly, step boring and facing, contour facing, boring and turning, and other combinations of straight and taper turning, can be done fast and accurately. Production is increased, unit costs are cut, and men and machines released for other work.

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MONARCH LATHES
Save Time

THE MONARCH MACHINE TOOL COMPANY • SIDNEY, OHIO

THE IRON AGE, June 3, 1943—85

This Industrial Week . . .

- Is Steel Easier?
- Need for Many More Ingots Is Cited
- Coal Strike, 48-Hr. Week Spotlit
- OPA Watched for Steel Price Action
- Nation's Ingot Rate Dips to 97 Per Cent

IS the steel industry likely to be soliciting orders on a wide scale before long? This question with all its implications has been foremost with steel executives and customers recently, and has led to a sharp division of opinion over the nation. Within the last week one authority publicly noted the "first signs of relaxation" in war steel needs, a statement which was disputed immediately by a Navy officer who asserted the Navy requires one million tons additional carbon steel per year to carry on its present program. At the same time in New York another authority highly placed in WPB told THE IRON AGE that, "We could use for war and essential civilian needs 2,000,000 tons more of steel ingots now."

Perhaps, as WPB officials believe, the controversy now rampant arises from the extensive changes in programs, representing a more selective phase of the war, and from the revised rules covering buying and scheduling. Whatever the causes, a full and frank breakdown of future tonnage requirements by the government would be helpful.

Steel sellers, unaccustomed to small order backlogs, may have given the impression they needed business when they sought recently to drive in CMP allocations, which have been slow coming to mills, particularly in alloy steel where inventories perhaps were higher than in some other lines of steel. Another factor believed to have bearing on the question is the desire of some steel makers to improve their "product mix" that all principal departments may be operating at peak efficiency and as profitably as possible.

Analysis of the disputed points in the discussion over whether steel really is becoming easier shows that by far the most complex and misunderstood problem is alloy steel, tightest of all types of steel since the war began. Despite all talk to the contrary, demand for electric steel appears to be as heavy as ever. Aircraft orders for the fourth quarter this year and for the first quarter of 1944 are increasing in number. At the same time, bottlenecks which existed a few months ago in regard to the procurement and distribution of aircraft steel have been blasted and WPB is

doing everything in its power to expedite the completion of electric steel installations ahead of other steel expansion programs. An interesting angle of the war-fostered NE grades, as far as the electric steel people are concerned, is that they believe these steels will mean a continuation of production of electric steel furnaces in the postwar period. They believe they will be able to produce these steels in close competition with open-hearth alloy steels.

As to whether order volume is up or down for the steel industry, all the significance that this index formerly held, vanished almost entirely when CMP and its controls were instituted.

HOLDING the industry's spot attention on Tuesday of this week was the stoppage of coal mining, second interruption of the season, catching the industry at a time when its stocks are poor. One of the largest by-product coke plants which serves some of the mightiest of the nation's steel plants is said to have only a 10 days' supply, an exceedingly slim lifeline. Therefore, if the coal strike lasts for a week, a severe drop in steel output will occur, and even if it ends within a few hours the position of the steel industry from the standpoint of its coke stocks will be further impaired.

Sporadic, outlaw strikes at Western Pennsylvania mines have been a constant source of concern to the steel industry in recent weeks, while the beehive coke supply situation has been growing tighter and tighter.

If steel tonnage is lost it will be irretrievable. National operations were estimated at 97 per cent on Tuesday by THE IRON AGE, lowest since last August. The rate was subject to change depending on the course of the coal mine walkout.

THE coal strike was not the only surprise born in Washington this week for the steel industry. The 48-hr. week came back into the spotlight with the announcement of instructions providing for the extension of the longer working week to all branches of the steel industry. Significantly, the instructions provide that regional directors of the War Manpower Commission shall consult with representatives of organized labor before granting temporary exemptions for the 48-hr. order of May 1.

This power given labor in deciding exemptions is considered by some authorities as another blow against management by the government and a definite victory for labor. Aug. 1 has been set as the final date on which men must be released from jobs in plants where the 48-hr. minimum week could not be reached by July 1.

In still another direction the steel industry is watch-

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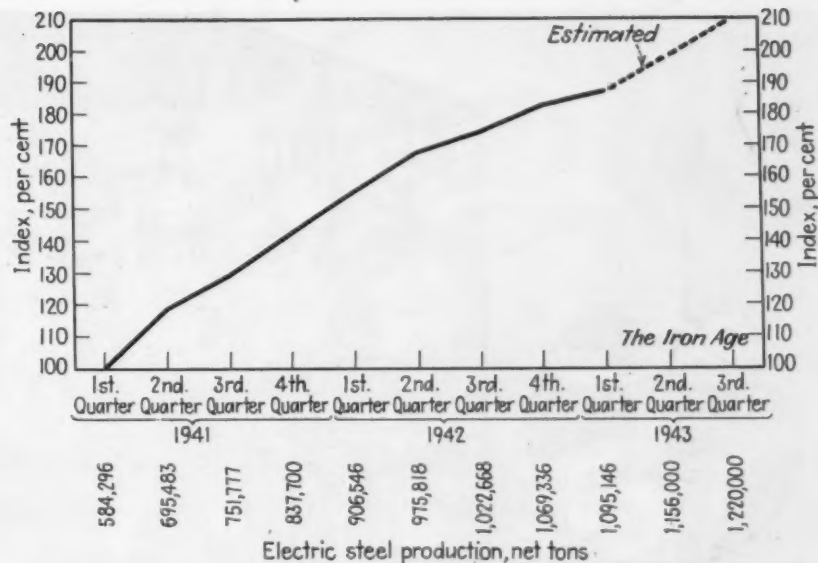
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June 2

ing developments closely. The reported recent attempt of the OPA to roll back tubular steel prices is interpreted in some quarters as the opening wedge to roll back the prices of all profitable items. OPA has assured some people that by the same virtue non-profitable items will be studied with a view toward raising them, if necessary. This, of course, is not shared by some steel people—or is it taken seriously. The OPA for some time has been attempting to obtain cost figures on the steel industry but has not been successful to any great degree. By threatening cost reductions they may obtain the figure which some divisions of the OPA have been after for some time.

Last week's surprise appointment of James F. Byrnes as War Mobilizer makes him, on paper at least, master of the Czars, in a move generally interpreted as an attempt to get around Congressional threats of intervention in the direction of the war. Mr. Byrnes is given authority to develop policies and programs, settle disputes between government agencies, and to issue directives affecting the policies or operations of all government agencies.

The question which perplexes Congress is: What happens to Donald M. Nelson and to WPB after this? Fears have been expressed by at least one Senator that under this new arrangement WPB would lose its ability to function as it will be a minority on the new committee. The general attitude of Congress is one of watchful waiting and skepticism on whether the latest reorganization will be an effective one.

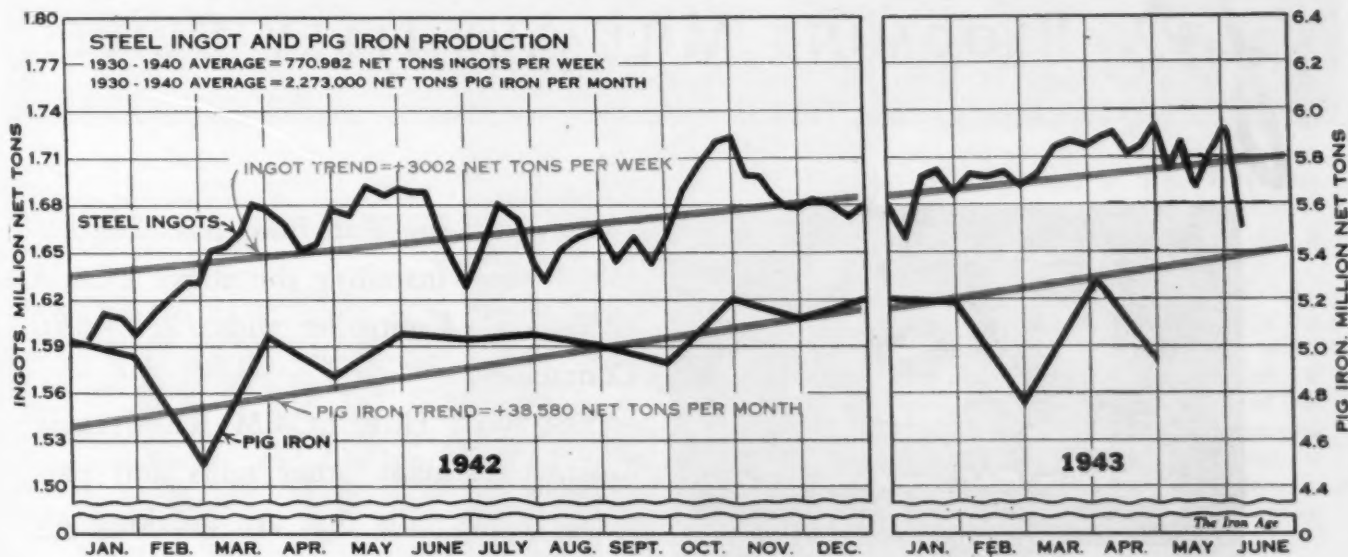
There is growing interest among manufacturers on the settlement of contracts that have been cut back



• • • How electric furnace steel production has grown since 1941, with first quarter of 1941 considered as 100. Second and third quarters of 1943 are estimated.

by the Army Ordnance, which is pressing to effect promptly the discharge of all obligations. At the same time WPB is endeavoring to work out an equitable plan for the termination of war contracts in anticipation of the time when peace comes. A tentative termination clause is reported being studied and some industrial executives have been given the opportunity to study it and make suggestions.

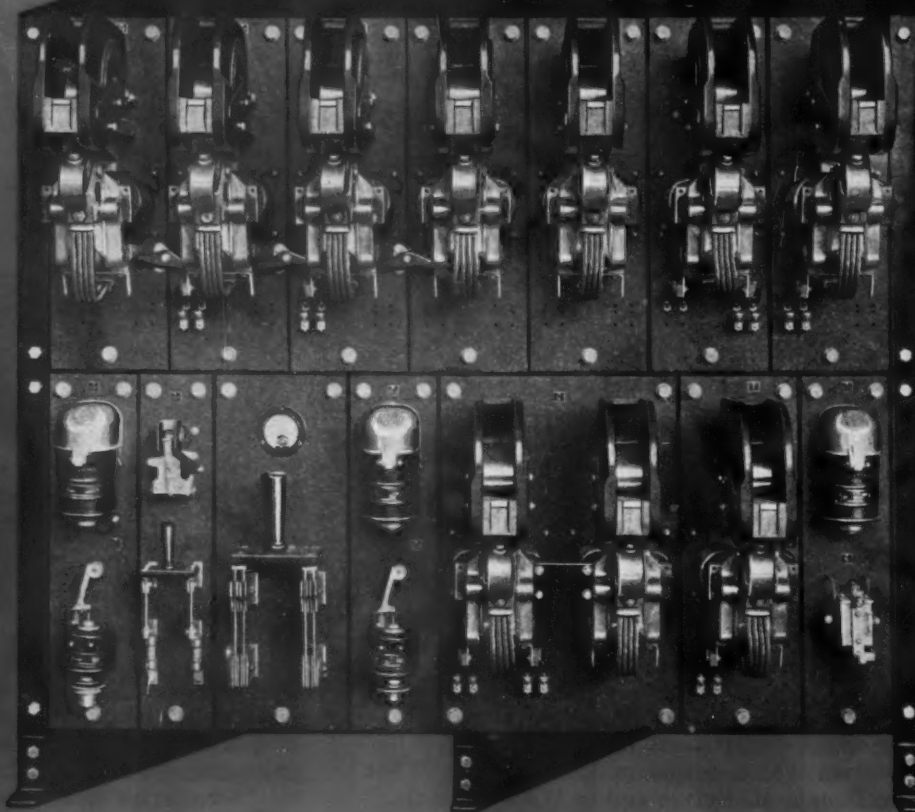
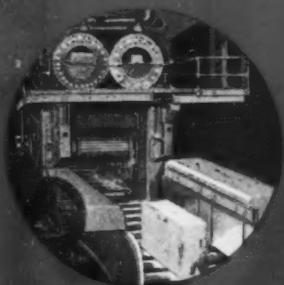
Pittsburgh steel ingot output is down half a point to 100.5 per cent, as is Youngstown at 96.5 per cent and Cleveland at 99.5. The rate has also dropped at Wheeling, from 91 per cent last week to 89, and Detroit from a revised rate of 100 to 98 per cent. Only at Buffalo, which is up two points to 106.5 per cent, has there been an increase in steelmaking.



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	S.Ohio River	St. Louis	East	Aggregate
May 27	101.0	97.0	97.0*	93.0	100.0	104.5	91.0	102.5	100.0*	102.0	103.0	99.0	101.0	98.0
June 3	100.5	97.0	96.5	93.0	99.5	106.5	89.0	102.5	98.0	102.0	103.0	99.0	101.0	97.0

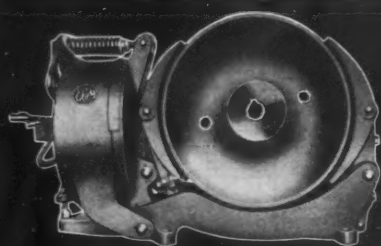
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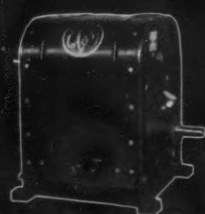
EC&M LINE-ARC CONTACTOR RHEOSTATIC CONTROL

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BLOOMING MILL AUXILIARY DRIVES



Bulletin 1004-D Type WB Brake



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An extra ingot an hour has been obtained since installing the above EC&M Screwdown Controller with LINE-ARC Contactors.

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THE ELECTRIC CONTROLLER & MFG. CO.
Cleveland Ohio



Naming of Byrnes as "Czar of Czars" on Home Front Arouses Question as to Whether Complex Agency Structure Has Been Benefited



• • • All eyes are on the new six-man Office of War Mobilization, headed by James F. Byrnes, as the top Federal agency for the conduct of the war on the home front. Will it succeed where innumerable other agencies and individuals have failed in the "Battle of Washington?"

Serving with Mr. Byrnes, who has resigned his former post as director of economic stabilization, are Secretary of War Stimson, Secretary of the Navy Knox, Judge Fred M. Vinson, WPB Chairman Donald M. Nelson, and Harry L. Hopkins, chairman of the munitions assignment board. They will act in an advisory and consultative capacity. Mr. Byrnes holds the power to issue directives on policy matter, "subject to the direction and control of the President."

The Office of War Mobilization (OWM) will have three main functions:

1. To develop unified programs and to establish policies for the maximum use of the nation's natural and industrial resources for military and civilian needs, for the effective use of the national manpower not in the armed forces, for the maintenance and stabilization of the civilian economy and for the adjustment of such economy to war needs and conditions.

2. To unify the activities of Federal agencies and departments engaged in or concerned with production, procurement, distribution or transportation of military or civilian supplies, materials and products, and to resolve and determine controversies between such agencies or departments, except those to be resolved by the Director of Economic Stabilization under Section 3, Title IV of Executive Order 9250. The excepted controversies relate to disputes between agencies over agricultural prices and wage increases which affect price ceilings.

3. To issue such directives on policy or operations to the Federal agencies and departments as may be necessary to carry out the programs developed, the policies established and the decisions made. It shall be the duty of all such agencies and departments to expect these directives and to make to the OWM such progress reports as may be required.

This meant that the President had subordinated to Mr. Byrnes the other "czars," such as Mr. Nelson in the field of war production.

It was noted that heads of several top war agencies were not included on the committee, including Chairman McNutt of the War Manpower Commission, War Food Administrator Davis and OPA Administrator Brown. All these agencies have been involved in heated controversies recently.

The reorganization effected by the President represented, on paper at

least, a forward step, and a move long recommended. Congress has been urging a super war board and there have been threats by certain Congressmen to force establishment of such an agency.

Many observers greeted the President's announcement with crossed fingers, however. They pointed out the move appeared to have been taken

reluctantly; that the administrative structure had been complicated instead of simplified; and that if this reorganization is like its numerous predecessors it will accomplish little. However, some persons felt that Donald M. Nelson would benefit by the shift, and that the new OWM might profit by the mistakes of the war boards which rose and fell in the past.

Coal Strike Seen Reducing Steel Production 25 to 75% in Few Weeks

Pittsburgh

• • • The second major coal strike early this week which followed a short one a month ago has served to further accentuate coal and coke shortages throughout the steel industry. Even though it ends quickly, the effects of these shut-downs will be felt throughout the balance of the year at many locations where coal consumption has been running ahead of production and

where urgently needed coke supplies have been on a decline.

If the present coal stoppage should last for a week, a severe drop in steel output in this district would result. United States Steel Corp.'s plants in the Pittsburgh and Youngstown area are so situated with coal supplies that a strike lasting a week would cut steel operations to 75 per cent of rated capacity, a drop of about 25 per cent. A strike lasting two weeks would cut this company's ingot output in this district to possibly 25 per cent of rated capacity—or a drop of 75 per cent.

Other companies here would not be affected so rapidly but nevertheless, would be forced to curtail operations to some extent in order to conserve supplies if the strike lasted for a week.

Carnegie-Illinois Steel Corp.'s Clairton, Pa. by-product plant, one of the largest in the world, has only about 10 days' supply of coal on hand. If developments in the latter part of this week show a continuation of the coal stoppage, drastic measures must be taken by cutbacks in operations in order to "stretch out" supplies on hand.

Aside from the coal stoppage early this week, the district has suffered within the past two weeks several "flash" or outlaw strikes at some locations. These have further intensified the coal shortage. With coal demand exceptionally heavy from all industries, it is doubted here if lost production can be completely made up.



PRODUCTION TEAM: Mrs. Alice Baker and her daughter run adjacent machine tools that help turn out driving machinery for U.S. Navy ships at the Philadelphia plant, Westinghouse Electric & Mfg. Co.

Steel Industry Achievements of Year Appraised

••• A new tone was evident at the American Iron and Steel Institute meeting in New York last week. Confidence and pride of accomplishment displaced the perplexity which was apparent a year ago when the war was new.

There were no brash claims that all war problems had been vanquished, but the tenor of the meeting concerned the phenomenal metallurgical progress which has been made and the remarkable production achieved. Most of the steel executives (they showed

Era of Low Cost Steel Is Past, Tower Predicts . . . Post-War Disposition of New Capacity Is Discussed

the strain of the last 12 months) agreed that an all-around better basis exists today for the wartime steel industry.

Mills are producing at the rate of 90,000,000 tons per year, more steel than the entire world was making in

the fourth year of the first World War, said Walter S. Tower, Institute president. U. S. metallurgical progress in two years has exceeded German accomplishments of the past decade and advanced beyond Japanese development of the last 30 years, said Maj. Gen. L. H. Campbell, Jr., Chief of Army Ordnance.

Calling for "a courageous national policy which will put war above politics and prevent labor stoppages in mines and mills," Mr. Tower reviewed the past year and looked ahead to the future.

"Within the year you have run the gamut from progressive extremes of restriction in the uses of steel to the first signs of relaxation, now shown in added tonnages being allotted for farm equipment, refrigerators, stoves, and some other essential items," he

W.P.B. Steel Expansion Program
Increases in Open Hearth Capacity (Net Ton Annually)

Company	Location	New Furnaces	Enlargements	Hot Metal	Total
American Locomotive Co.	Latrobe, Pa.	.....	20,000	.....	20,000
American Locomotive Co.	Chicago Hts., Ill.	.....	100,000	.....	100,000
American Rolling Mill Co.					
Sheffield Steel Corp.	Kansas City, Mo.	.....	72,000	.....	72,000
Sheffield Steel Corp.	Houston, Texas	525,000	.....	.....	525,000
Barium Stainless Steel Corp.	Canton, Ohio	30,000	.....	.....	30,000
Bethlehem Steel Co.	Bethlehem, Pa.	300,000	.....	.....	300,000
Bethlehem Steel Co.	San Francisco, Cal.	55,000	.....	.....	55,000
Bethlehem Steel Co.	Seattle, Wash.	45,000	.....	.....	45,000
Byers Co., A. M.	Ambridge, Pa.	36,000	.....	.....	36,000
Continental Steel Corp.	Kokomo, Ind.	.....	30,000	.....	30,000
Crucible Steel Co. of America	Pittsburgh, Pa.	36,000	.....	.....	36,000
Granite City Steel Co.	Granite City, Ill.	300,000	.....	.....	300,000
Great Lakes Steel Corp.	Detroit, Mich.	25,000	.....	.....	25,000
Jones & Laughlin Steel Corp.	Pittsburgh, Pa.	.....	70,000	.....	70,000
Kaiser Co., Henry J.	Fontana, Cal.	675,000	.....	.....	675,000
Laclede Steel Co.	Alton, Ill.	.....	40,000	.....	40,000
Lukens Steel Co.	Coatesville, Pa.	160,000	.....	.....	160,000
Phoenix Iron Co.	Phoenixville, Pa.	50,000	.....	.....	50,000
Pittsburgh Steel Co.	Monessen, Pa.	.....	67,000	181,000	248,000
Republic Steel Corp.	Cleveland, Ohio	.....	.....	240,000	240,000
Republic Steel Corp.	Youngstown, Ohio	.....	.....	220,000	220,000
Republic Steel Corp.	Gadsden, Ala.	.....	.....	120,000	120,000
U. S. Steel Corp.					
American Steel & Wire Co.	Duluth, Minn.	.....	.....	60,000	60,000
American Steel & Wire Co.	Donora, Pa.	.....	88,000	.....	88,000
Carnegie-Illinois Steel Corp.	Braddock, Pa.	.....	25,000	.....	25,000
Carnegie-Illinois Steel Corp.	Gary, Ind.	150,000	.....	150,000	300,000
Carnegie-Illinois Steel Corp.	Homestead, Pa.	1,740,000	.....	.....	1,740,000
Carnegie-Illinois Steel Corp.	Youngstown, Ohio	.....	80,000	.....	80,000
Columbia Steel Co.	Geneva, Utah	1,300,000	.....	.....	1,300,000
Tennessee Coal, Iron & Railroad Co.	Birmingham, Ala.	.....	.....	120,000	120,000
Youngstown Sheet & Tube Co.	East Chicago, Ind.	.....	125,000	.....	125,000
Total increase in WPB program		5,427,000	717,000	1,091,000	7,235,000
Per cent of total WPB program		75%	10%	15%	100%
<hr/>					
Increase in WPB program	7,235,000	Annual capacity 1-1-42			78,107,000
Total war expansion since		Annual capacity 1-1-43			79,181,000
1-1-40	10,766,000	Annual capacity end of program			84,788,000
Annual capacity 1-1-38	71,472,000				
Annual capacity 1-1-39	72,960,000	Conversions to increase alloy steel pro-			
Annual capacity 1-1-40	73,722,000	duction will reduce effective capacity by			
Annual capacity 1-1-41	74,566,000	500,000 to 600,000 tons.			

Metallics Balance of the Industry

Approximate metallics balance of the industry operating at capacity after completion of the steel expansion program.

Blast Furnace Production	Net Tons
Pig iron and ferroalloys capacity, annually	71,287,000
Less merchant pig iron and ferroalloys	10,000,000
Pig iron available for steel-making	61,287,000
Steelmaking Production	
Open hearth capacity annually	84,788,000
Bessemer capacity annually	6,553,000
Electric furnace capacity annually	6,315,000
Total ingot capacity	97,656,000
Recirculating scrap—27.75% of ingots	27,100,000
Electric furnace charge	6,946,000
Recirculating scrap available for open hearth	20,154,000
Pig iron available for steel-making	61,287,000
Bessemer charge	7,210,000
Pig iron available for open hearth	54,077,000
Open hearth charge	95,387,000
Pig iron—56.7% of charge	54,077,000
Recirculating scrap	20,154,000
Metallics in ore	4,769,000
Purchased scrap (by difference)	16,380,000

NEWS OF INDUSTRY

and Future Trends Analyzed at New York Session

said. "Unless there are more of such relaxations in the near future, vital non-military needs like railroads, utilities, oil production, and various consumer items may be imperiled, or some of the steel which can be made may not go into the best use for the general good of the nation's war effort.

"You have done a notable job of keeping an even keel for prices, in spite of adverse influences. Can you go on in the same course to the end of the war and beyond, still preserving the essential strength of the nation's most vital industry? Certainly you can not if every wage demand is compromised upward, and cost of raw materials follow. Price ceilings cannot be preserved indefinitely against constantly rising costs of production.

"The main job of organizing the steel industry for the war effort is now well in hand. There are signs which indicate the end of war plant expansion and an approach to the saturation point for industrial output. Your task now begins to settle down to one of holding about the present level until the demand for steel for direct war uses starts to decline.

"Before our next meeting, if various factors combine favorably, the European part of this war could be over, or close enough to its end to react on the extent or kind of demand for steel products. Hence it is not too early for those of you who determine important policies, to be turning some thought to the next group of problems which steelmakers must face.

"Unlike most other industries, whose plants have been largely diverted to use for war, your industry will not face any large scale problems of reconverting its facilities in order to produce steel for peacetime uses. From that aspect, therefore, there

need be no time lag in going back to the normal functions of steelmaking. Your mills will be ready and waiting before peacetime consumption of steel

is able to take all your tonnage. "Any substantial drop in need for some kinds of war materials, such as might naturally follow the end of

Increases in Blast Furnace Capacity—Pig Iron and Ferroalloys
(Net Ton Annually)

Company	Location	New Furnaces	Reha- bilitated Furnaces	Rebuilt and Enlarged Furnaces	Use of Sinter	Total Capacity Increase
American Rolling Mill Co.	Ashland	432,000	.....	.....	.....	432,000
Sheffield Steel Corp.	Houston	274,000	.....	.....	.....	274,000
Bethlehem Steel Co.	Bethlehem	432,000	.....	.....	.....	432,000
Bethlehem Steel Co.	Johnstown	.....	.....	54,000	.....	54,000
Bethlehem Steel Co.	Lackawanna	432,000	.....	192,000	.....	624,000
Colorado Fuel & Iron Co.	Pueblo, Colo.	227,000	.....	.....	.....	227,000
Cumberland Iron Co.	Cumberland	.....	32,000	.....	.....	32,000
Inland Steel Co.	Indiana	.....	.....	.....	.....	.....
Interlake Iron Corp.	Harbor	1,260,000	.....	.....	73,000	1,333,000
Interlake Iron Corp.	Chicago	.....	.....	100,000	33,000	133,000
Interlake Iron Corp.	Toledo	.....	.....	.....	32,000	32,000
Jones & Laughlin Steel Corp.	Aliquippa	.....	.....	114,000	402,000	516,000
Kaiser Co., Henry J.	Fontana, Cal.	432,000	.....	.....	.....	432,000
Koppers-United Co.	Granite City	.....	225,000	.....	.....	225,000
Lone Star Steel Co.	Daingerfield	432,000	.....	.....	.....	432,000
Pittsburgh Coke & Iron Co.	Neville Island	.....	.....	40,000	40,000	80,000
Pittsburgh Ferro Manganese Co.	Chester	.....	144,000	.....	.....	144,000
Pittsburgh Steel Co.	Monessen	432,000	.....	.....	.....	432,000
Republic Steel Corp.	Gadsden	280,000	.....	.....	.....	280,000
Republic Steel Corp.	Cleveland	450,000	.....	.....	.....	450,000
Republic Steel Corp.	Youngstown	392,000	.....	.....	.....	392,000
Republic Steel Corp.	Chicago	450,000	.....	.....	.....	450,000
United States Steel Corp.	American Steel & Wire Co.	Cleveland	.....	40,000	.....	40,000
American Steel & Wire Co.	Duluth	.....	266,000	.....	.....	266,000
Carnegie-Illinois Steel Corp.	Braddock	860,000	.....	.....	.....	860,000
Carnegie-Illinois Steel Corp.	Clairton	.....	.....	100,000	.....	100,000
Carnegie-Illinois Steel Corp.	Rankin	.....	.....	131,000	.....	131,000
Carnegie-Illinois Steel Corp.	Mingo Junction	.....	.....	32,000	.....	32,000
Carnegie-Illinois Steel Corp.	Gary	.....	.....	144,000	.....	144,000
Columbia Steel Co.	Provo	.....	300,000	.....	.....	300,000
Columbia Steel Co.	Geneva	1,149,000	.....	.....	.....	1,149,000
National Tube Co.	Lorain	.....	.....	144,000	.....	144,000
Tennessee Coal Iron & R.R. Co.	Birmingham	319,000	.....	.....	.....	319,000
Wheeling Steel Corp.	Steubenville	.....	.....	.....	70,000	70,000
Youngstown Sheet & Tube Co.	Campbell	.....	.....	108,000	139,000	247,000
Youngstown Sheet & Tube Co.	Indiana Harbor	.....	.....	.....	82,000	82,000
Total increase in WPB program		8,253,000	967,000	1,199,000	851,000	11,270,000
Increase in WPB program		11,270,000	Annual capacity 1-1-39		56,326,000	
Annual capacity 1-1-40		55,724,000	Annual capacity 1-1-42		60,394,000	
Total war expansion since 1-1-40		15,563,000	Annual capacity 1-1-43		63,934,000	
			Annual capacity end of program		71,287,000	

• • • All the charts covering steel expansion on these pages came from the paper by J. A. Kinney, of Bethlehem Steel Co., given at the afternoon session of the Institute.

See THE IRON AGE, May 27, pages 85-86B, for status of steel expansion program as of May 1, 1943, illustrated by eight large and authentic charts.

W.P.B. Steel Expansion Program
Increases in Electric Furnace Capacity
(Net tons annually)

Company	Location	Capacity
American Rolling Mill Co.	Middletown, Ohio	43,000
Andrews Steel Co.	Newport, Ky.	195,000
Babcock & Wilcox Tube Co.	Beaver Falls, Pa.	48,000
Byers Co., A. M.	Ambridge, Pa.	72,000
Carnegie-Illinois Steel Corp.	Duquesne, Pa.	165,000
Copperweld Steel Co.	Warren, Ohio	324,000
Jessop Steel Co.	Washington, Pa.	46,000
Isaacson Iron Works	Seattle, Wash.	75,000
Oregon Electric Steel Rolling Mills	Portland, Ore.	60,000
Pacific States Steel Corp.	Niles, Cal.	54,000
Republic Steel Corp.	Canton, Ohio	221,000
Republic Steel Corp.	South Chicago, Ill.	918,000
Rotary Electric Steel Co.	Detroit, Mich.	80,000
Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	120,000
Miscellaneous additions not in projects		146,000
Total increase in WPB program		2,567,000
Total war expansion since 1-1-40		4,427,000

Annual capacity Jan. 1, 1938	1,500,000
Annual capacity Jan. 1, 1939	1,730,000
Annual capacity Jan. 1, 1940	1,888,000
Annual capacity Jan. 1, 1941	2,590,000
Annual capacity Jan. 1, 1942	3,741,000
Annual capacity Jan. 1, 1943	4,559,000
Annual capacity on completion of program	6,315,000

fighting in Europe, probably will reveal large inventories of unfabricated or partly processed steel in the hands of war industries. It is inevitable that production on any such gigantic scale as in recent months must have absorbed millions of tons of steel in the space between the rolling mill and

the point of emergence of the complete manufactured articles, like ships, tanks, planes, guns and projectiles. Some shrewd guesses have set that figure all the way up to 18 or 20 million tons by the end of last year.

"Whatever the size of those inventories, when war needs stop, efforts

to work them off at the expense of new production from the mills will be influenced by the degree of fabrication and the nature of the products.

"You have probably seen the end of low cost steel from your mills. At least for a long time ahead there seems to be no room for escape from the rigidity of high cost factors which have been created over the last ten years. Certainly present costs of materials and supplies, wage levels, taxes are prohibitive for cheap steel. And any substantial downward readjustments of them would involve deflationary forces, the full effects of which might be close to ruinous.

"You probably will have to decide which of two courses you prefer to follow. The first may seem simple and easy—to operate such part of steelmaking capacity as domestic needs will support, and let the rest lie idle. Will that idle part be the sizable fraction in which the Federal government has a substantial stake? The other course is to seek a higher rate of activity through a drive for world markets. That course is complicated and difficult.

Vice Admiral S. M. Robinson of the Navy told of the revolution which steel has caused in naval warfare than the most radical prophet could have anticipated.

Asserting that the Navy probably never will have enough steel, Admiral Robinson told how "a year ago at Mare Island our people were obliged to take floor plates out of the shops to use for ship repairs. Fortunately this crisis has passed."

"It is not too far out of the way to say that a 45,000-ton battleship requires more than 100,000 tons of ingots," he said.

"A problem for both the Navy and the steel industry is the lead factor in the case of major combatant vessels," he said, admitting that inventory control has been a problem. "Large turbine-driven ships such as aircraft carriers and cruisers where the building time after keel-laying runs up to two and one-half years should have 12 per cent and preferably 20 per cent of their steel delivered at the shipyard before the keel is laid in order to insure orderly construction. The main propulsion machinery which must be delivered about one year before completion of the vessel, also requires steel far in advance. For example, the alloy steel for parts of the machinery like the turbine rotor must be included in the melting schedules 15

W.P.B. Steel Expansion Program
Anticipated Ore Sources for Expanded Facilities
(WPB Estimate March 15, 1943)

Source of Ore	ANNUAL CAPACITY N.T.			Program Increase
	Jan. 1, 1942	Jan. 1, 1943	End of Program	
Texas and Missouri	22,000	56,000	1,500,000	1,478,000
Foreign	2,312,000	530,000	.....	—2,312,000
Eastern	3,696,000	4,600,000	7,865,000	4,169,000
Western	1,568,000	2,624,000	5,200,000	3,632,000
Southern	9,408,000	10,416,000	12,265,000	2,857,000
Lake	101,577,000	104,621,000	112,109,000	10,532,000
Total	118,583,000	122,847,000	138,989,000	20,356,000
<i>Consumption of Lake Ore at Completion of Program</i>				
Estimated annual consumption U.S.A.				105,350,000
Estimated annual consumption Canada				3,751,000
Estimated annual consumption—Total				109,101,000
<i>Transportation of Lake Ore at Completion of Program</i>				
Total by water				107,299,360
Total by rail				2,460,640
Total shipping capacity				109,760,000
By water to Canada				3,751,000
Total to U.S.A.				106,009,000

months before the turbines are to be delivered to the shipyard.

"The time factor is important also in the case of heavy armor. Casting of ingots for armor must begin two months before the keel of a battleship is laid. The finished armor is not all delivered until 18 months after keel-laying. Single plates run up to 100 tons in weight and sometimes remain in a furnace for 45 days at a time. Machining these great masses of steel to tolerance as low as 3/16 in. sometimes requires as much time as forging and treatment. And the 14,000-ton presses and giant planers used in making armor may themselves require 18 months to build.

Illustrating one form of metallurgical advancement in the United States, General Campbell pointed to the production of tank armor by casting and its fabrication by welding, now well established practices. He also called attention to the fact that enemy nations still use riveted tanks. "Not long ago," Gen. Campbell said, "the casting and heat treatment of intricate shapes incorporating steel

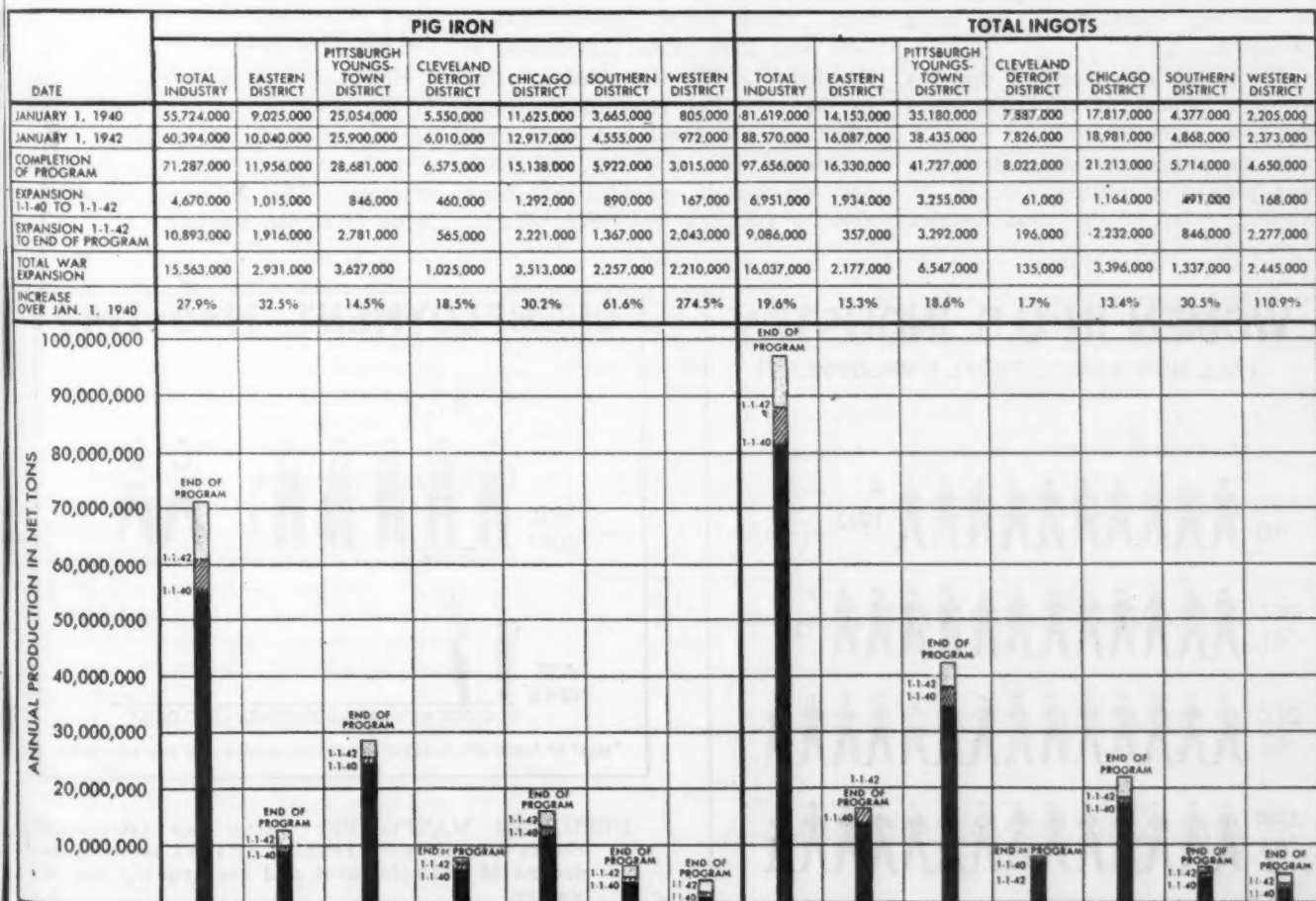
(CONTINUED ON PAGE 144)

W.P.B. Steel Expansion Program Increases in By-Product Coke Capacity (Net Tons Annually)

Company	Location	Capacity
Bethlehem Steel Co.	Lackawanna, N. Y.	438,000
Bethlehem Steel Co.	Steelton, Pa.	365,000
Carnegie-Illinois Steel Corp.	Gary, Ind.	350,000
Columbia Steel Co.	Geneva, Utah	1,006,000
Inland Steel Co.	Indiana Harbor, Ind.	798,000
Interlake Iron Corp.	Erie, Pa.	210,000
Kaiser Co., Henry J.	Fontana, Cal.	340,000
Koppers-United	Granite City, Ill.	305,000
Lone Star Steel Co.	Daingerfield, Texas	375,000
Pittsburgh Steel Co.	Monessen, Pa.	460,000
Republic Steel Corp.	Chicago, Ill.	465,000
Republic Steel Corp.	Cleveland, Ohio	465,000
Republic Steel Corp.	Gadsden, Ala.	400,000
Republic Steel Corp.	Warren, Ohio	375,000
Sheffield Steel Corp.	Houston, Texas	245,000
Tennessee Coal, Iron & Railroad Co.	Birmingham, Ala.	375,000
Weirton Steel Co.	Weirton, W. Va.	245,000
Total increase in WPB program		7,217,000
Total war expansion since 1-1-40		8,978,000

Annual capacity Jan. 1, 1938	44,791,000
Annual capacity Jan. 1, 1939	46,171,000
Annual capacity Jan. 1, 1940	48,384,000
Annual capacity Jan. 1, 1941	48,794,000
Annual capacity Jan. 1, 1942	50,292,000
Annual capacity Jan. 1, 1943	51,708,000
Annual capacity on completion of program	57,362,000

Geographical Distribution of Pig Iron and Ingot Capacity (Net Tons—Annually)



Ordnance District Reports on Prime Contracts to Small Firms

Cleveland

• • • In adhering to the policy of spreading work among small plants as well as large ones, analysis of contracts placed by the Cleveland Ordnance District of the War Department shows that 45 per cent of its prime contracts by dollar volume for war materiel went to industrial concerns employing less than 200 persons. Furthermore, the analysis indicated 56 per cent of the district's entire volume of \$2,000,000,000 in contracts being administered has been passed along through sub-contracts to thousands of plants, both large and small. Many of these sub-contracts are held by firms with less than 100 employees. The contracts in force cover some 5000 items.

An example cited was that of a stone quarry which rebuilt stone planers, tooled them, and today is supplying tank bogie support brackets. Another example is that of a plant in the district with fewer than 50 employees that makes 85 per cent of the baffles, small brass plates used in artillery fuzes, which are being produced.

The report also disclosed that the average number of sub-contractors per prime contract is 72.

In discussing current trends in the war production picture, Col. H. M. Reedall, chief of the local district,

pointed out several factors in relation to prime contracts in the district that will affect manufacturers more directly as the war progresses. A move toward the abandonment of cost-plus-fixed-fee contracts is under way with some of such contracts already being converted to fixed price contracts. Of the \$550,000,000 in cost plus fixed fee contracts allotted in this district, only a very small percentage has been converted to a fixed price basis to date, but there is expected to be an acceleration in this direction.

One stipulation made by the Ordnance Department in converting is that under the revised plan a prime contractor must maintain with the same sub-contractors the same percentage of the entire contract that the sub-contract had under the cost plus fixed fee basis. This stipulation is also made on contracts that are cut-back.

Generally, cut-backs and cancellations of contracts in the Cleveland Ordnance district have not been severe. There are at present between 2400 and 2500 prime contractors in the district. The diversified industry in the area has lessened the total effect of cut-backs, and until now companies with contracts that have been cut-back or cancelled have been able to get new contracts quickly.

This condition, however, is not going to continue.

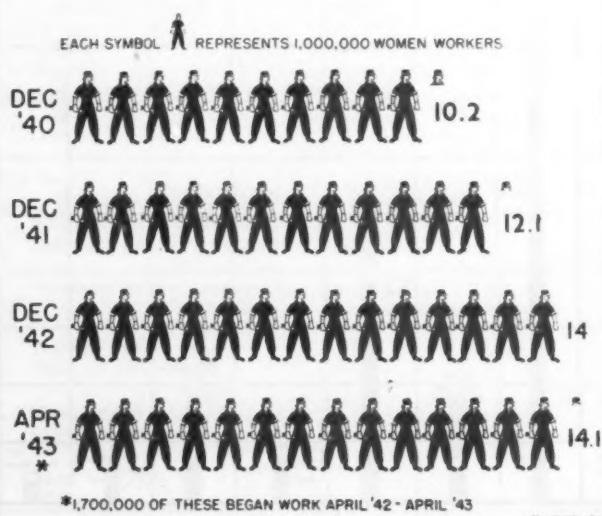
Of the 15 or 20 cancelled contracts in the Cleveland Ordnance District covering Ordnance materiel, about 30 per cent have been completely settled and payment made by certificate to the contractors. One of the chief assets to a company that is trying to settle with the Ordnance Department on contracts that have been cut-back or cancelled entirely is a good accounting set-up. While in the early months of cut-backs, Ordnance was forced to make complete audits in order to settle such cancellations, the volume now is reaching the point where short-cuts will have to be taken.

The Ordnance district has been given authority to adjust contract prices to provide for the termination or cancellation of contracts. This action follows the prime contractor's request for settlement.

Steps are being taken by armed services to eliminate as far as possible spots in military vehicles, armament and other weapons where breakdowns are most likely to occur. One of these points that has been under close surveillance for some time is the hydraulic systems.

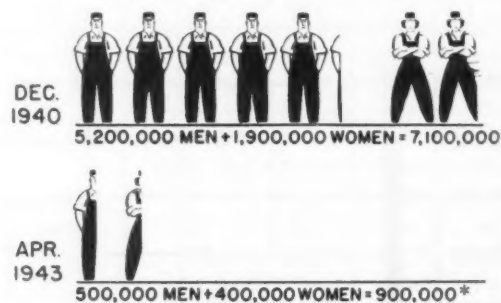
Electrical and mechanical systems of all types have been tried. One of the problems that must be overcome in such a conversion is the power source. This problem gradually is being overcome, however.

WOMEN IN U.S. INDUSTRY (ALL NON-AGRICULTURAL EMPLOYMENT)



UNEMPLOYMENT, 1940-1943

EACH SYMBOL REPRESENTS 1,000,000 UNEMPLOYED



DEPICTING MANPOWER: These two interesting charts recently were released by OWI showing the decline of unemployment and the growing use of women.

Quick and Drastic Changes in Use of Materials at War's End Held Unlikely

New York

••• The new and improved materials and the present world-wide development of new sources of materials will have decided effects on products, but no immediate radical transformation should be expected, in the opinion of Col. George S. Brady, Ordnance Department, Products Branch, Resources and Production Division, Washington, speaking last week before the National Association of Purchasing Agents.

Pointing out that "world quota systems" might be applied to many raw materials, Col. Brady nevertheless insisted that such system "if properly applied should not prevent private companies from purchasing individually in any market they choose."

Stressing that "today we face more marvelous possibilities in materials than ever before," Col. Brady warned that "the rapidity of progress in utilizing them will depend upon our ability to interpret properly what we have and take sensibly planned steps to coordinate our efforts."

Despite the fact that aluminum capacity at the end of 1943 will be more than a million tons and magnesium capacity will exceed 300,000 tons, "there will be no excess capacity of aluminum after the war," Col. Brady said. "Any dreams of constructing our cars, ships and buildings of aluminum alloys will be out of the question until we have ten times any production capacities now contemplated," he explained.

Discussing the future of plastics, the speaker stated that despite the fact that production of plastics has been increasing 50 per cent per year, and although their effect will be felt in every product, "the total effect will not be enough to reduce the total volume of metals used." Many of the newer war applications will be translated into civilian applications. Thus, "the curved plastic nose of the aircraft bomber immediately suggests a curved plastic windshield for the civilian automobile."

"We cannot judge the coming post-war problems by what happened after the war of 1914-18," he said. The economic setting is not the same because the end of the fighting in 1918 was merely an armistice in a long period of economic wars. What we are to expect after the present world strug-

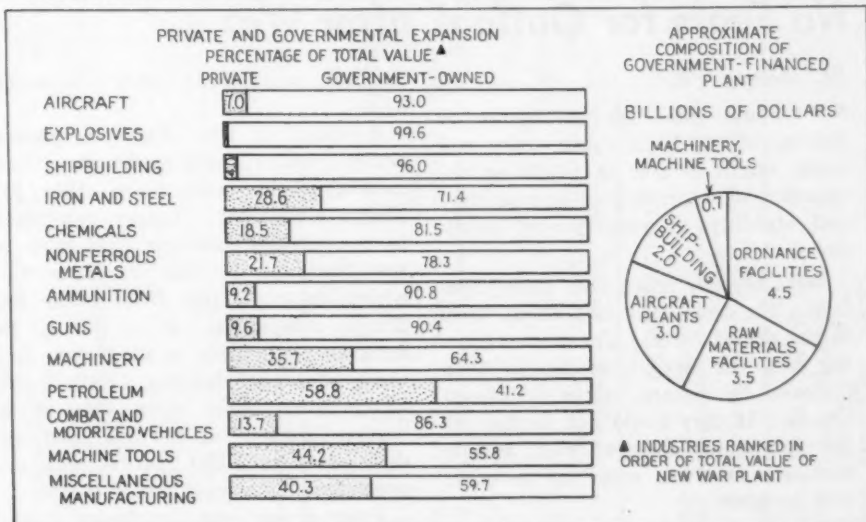
gle might well be compared with what happened in the period following the war of 1812

"Today we face more marvelous possibilities in materials than ever before. . . . The materials most in the public eye as substitutes for old-line materials are aluminum, magnesium, synthetic rubber, plastics. By the end of 1943 the aluminum capacity of the country will be more than a million tons, compared with a production of

only 163,500 tons in 1939. Magnesium capacity will be 300,000 tons, compared with a production of only 3350 tons in 1939. In 1939 the magnesium industry was already 137 years old, and for 24 years previous to this war it was a going commercial industry in the United States. The great strides have been accomplished during this war period under public financing. More than half of the aluminum capacity is now government owned, and about 90 per cent of the magnesium capacity is government owned. Besides these production changes, vital changes in the technology of use have

CHART FROM NEW POST-WAR STUDY: This was among the charts prepared by the Conference Board for its recent annual meeting in New York. Government ownership of new plants is most marked where prospects of post-war conversion are least certain, says the study.

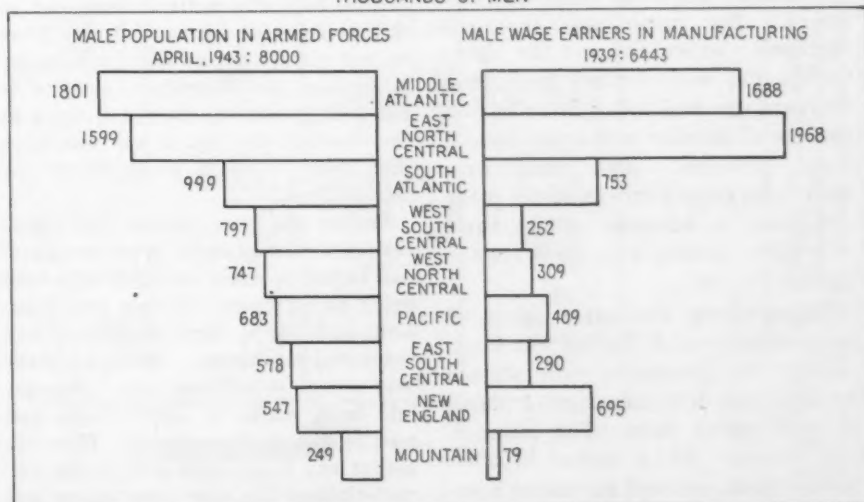
ADDITIONS TO MANUFACTURING PLANT, JUNE, 1940 - FEBRUARY, 1943



WHEN DEMOBILIZATION COMES: An employment problem greater in magnitude than any similar previous task in the U. S. will be created, says the Conference Board's post-war study, prepared for its recent annual meeting in New York.

REGIONAL ASPECTS OF DEMOBILIZATION

THOUSANDS OF MEN



occurred, and also changes in the economic geography of this light-metal industry. Aluminum forging production in 1942 was 25 times what it was in 1938. Just before this war broke over us, the British Admiralty had approved some newer high-strength aluminum alloys for ship construction.

"An interesting geographic change has taken place in the economic position of the light-metals. By the end of 1943 more metallic aluminum will be produced on the Pacific Coast than was produced in the entire country in 1939. The chief cost of production is electric power, and the cheapest and most available power is on our West Coast. After this war, therefore, the center of aircraft, shipbuilding, and

transport equipment industries of the world may well be on our West Coast.

"At the end of this war we will have a tremendous increase in our available supply of the light metals. But on a weight basis the million tons of aluminum is equivalent to only about three million tons of steel. So any dreams of constructing our cars, ships and buildings of aluminum alloys would be out of the question until we have ten times any production capacities now contemplated. In fact, the procurement of such quantities will have to wait until we devise new methods of reduction of the metal from the ores. There will be no excess capacity of aluminum after the war.

Powder Metallurgy Center Holds No Fears for Outlook after War

St. Marys, Pa.

• • • From this "carbon center of the world" perhaps other cities and towns might be able to benefit on the question of assured post-war activity and stability of employment conditions.

With slightly more than 7500 population the town has lost about 1000 to the armed forces. Those men leaving however have immediately been replaced by sisters, wives or sweethearts. If they could not do the job the companies changed men around until the loss was made up on other jobs by girls.

When the town was founded about 1840 by German Catholics (and there are no more pro-Germans here than in any town) the main industry was lumber. Farsighted business men saw that this phase would pass and immediately began to think of other things. The result was that the Stackpole Carbon Co. and the Speer Carbon Co. were formed more than 40 years ago and today make carbon and metal brushes and some molded metal products. Since that time there have sprung into existence other companies in business of the same or similar nature, such as Keystone Carbon Co., etc.

Exemplifying the same spirit of independence which formed this town, most of the companies were started by men who left the original places of employment here. For instance, one company which makes brushes, molded parts and self lubricated bearings today has as its heads men who

formerly worked for other companies here.

Another of the four companies which makes carbon brushes has members who came from other St. Marys companies. Latest newcomer to the molded products field here is the National Molded Products Co. which drew officials from other St. Marys companies. It is not to be inferred that there is ill feeling because of these changes. Rather the whole town looks upon this as a "carry forward" of the qualifications that have made St. Marys more independent than most small towns.

From a post-war standpoint it appears that this village will have no major problems, due to the fact that the business men have struck upon an industry endeavor which is gaining ground by leaps and bounds—powder metallurgy. Three of the plants here are actively engaged in this process for the war effort. They do not claim that powder metallurgy or molded metal product activity is yet full grown but they will fight at the drop of the hat if any one says that there is not a great future for this "infant."

Before the war molded self-lubricating bearings and machine parts had begun to make an entry into such fields as sweepers, electric refrigeration, auto parts, farm machinery and industrial machinery. Although there was some skepticism, etc., progress had been made on applications and possibilities in these fields. However before any large scale acceptance had materialized the war came along and powder metallurgy "went to war."

Probably one of the most important findings of this industry in the past few years has been the tacit recognition of its limitations. While the industry is still in the throes of adolescence it must be remembered that only a few years ago it had not been weaned yet. The trials and tribulations with government specifications (which many powder metallurgical men think are too stringent) have taught molded product men things that in peace times would have taken years. For that reason St. Marys business men think that after the war powder metallurgy will be accepted and will do a better job in those applications where only a slight "foothold" had been obtained in pre-war periods.

Molded metal men here are frank to say that powder metallurgy will not find favor in those applications where extreme hardness is required or where high tensile and compression is indicated. There are also cases where government screw thread tolerances are too tight for some molded products. Nevertheless it is said here that many machine parts will in the future be made from molded metal because of the self-lubricating qualities as well as the wearing ability.

The war business that firms have had here have been a great teacher of "what is to come." The industry is streamlined it is said and according to many officials there will be no post-war problem for companies making powder metallurgical products. With more than 32 powders involved already and with various combinations, etc., it is claimed here that within five years the powder metallurgical industry will have the chance of replacing (if it can) a large segment of present machined parts.

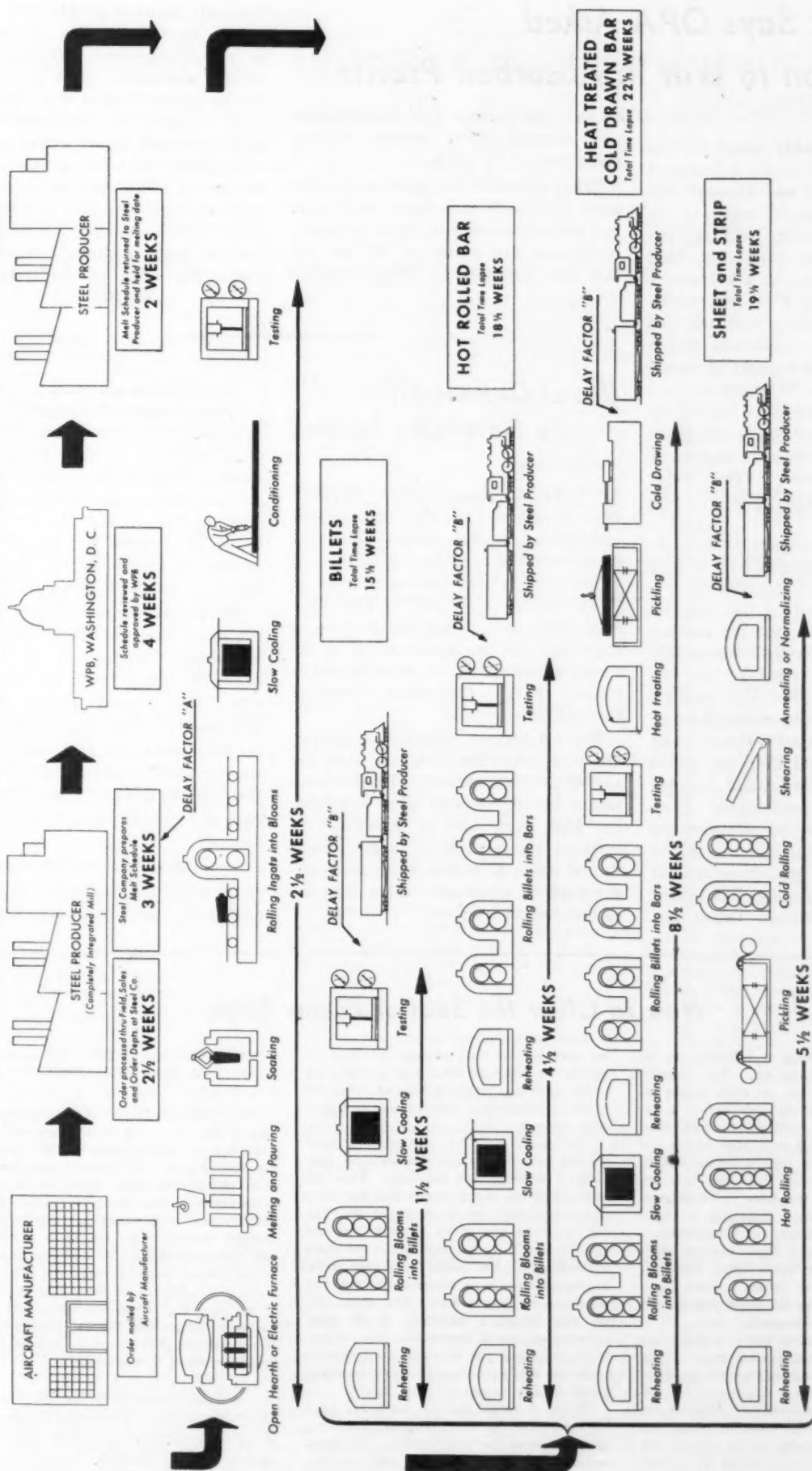
Least some people think that the powder field is thinking in grand terms it can be said, as the result of talking to officials of companies here, they know they have a hard road ahead, they believe in their product, they think they have a niche in the metal field, and finally they think they have only scratched the surface.

Mayers Named to SWPC

Washington

• • • Chauncey M. Mayers, of Scarsdale, N. Y., president of the L. & C. Mayers Co., Inc., of New York, has been appointed director of the Administrative Division of the Smaller War Plants Corp. it was announced recently.

TIME CYCLE FOR PROCUREMENT OF TYPICAL AIRCRAFT ALLOY STEEL PRODUCTS



DELAY FACTORS

"A"—Cannot schedule because of backlog of orders

Cannot schedule until enough orders have accumulated for minimum melt

5074

Delays arising from restrictions and rejections at any point

WHY SCHEDULE ORDERS IN ADVANCE? This chart (prepared by the Army Air

Force Materiel Command, Materials Branch, under the direction of Lt. Col. A. E. R.

Peterka) shows the actual steps involved in the production of four types of air-

... reveals the actual steps involved in the production of four types of aircraft alloy steel. It explains why some products require more time than others.

Delays are not charted.

Die Caster Says OPA Asked Contribution to War in Absorbed Profits

New York

• • • OPA has frankly asked the die casting industry to make a financial contribution to the war through the terms of a price measure which in the opinion of the industry will "anticipatorily absorb" the profits of most die casters, according to a statement last week by Anton F. Waltz, president of the Die Casting Institute and chairman of the committee which negotiated the price regulation terms with OPA. This profit absorption, according to Mr. Waltz, was desired by OPA in preference to profit recapture through renegotiation of contracts or excess profits taxes. The price measure adopted was MPR 377, effective May 1.

Mr. Waltz's statement, aimed at clarifying in the industry's mind how the negotiations were approached, continued, "In the course of the negotiations, OPA conceded that die casting prices had not changed materially since October, 1941—before we entered the war! That die casting profits were less in the second half of 1942, despite increased volume, than in the first half and that our profit trend is definitely downward because of rising costs of production. They conceded that while 90 per cent of commercial die casting production has been exempt from any price control since July 1, 1942 (under Combatant Materials Supplementary Order No.

4) yet die casters held prices down and showed lower profits without price control by OPA.

"They conceded that production costs have increased materially since 1941 and are still increasing, and that some companies are going to be hurt by this new Regulation. They admitted

that any gains in profits over pre-war years have been due to increased volume, long runs and greater efficiency, and not to price boosts. They finally acknowledged that only about 5 per cent of the companies in the industry could show profits above the ceiling that OPA felt should be placed on profits. Therefore an entire industry is being specially regulated because prices 'threaten' to rise due to current wage negotiations and other increasing costs of doing business."

Use of Cement Kilns To Sinter Ore Studied

Washington

• • • WPB's Conservation Division announced last Thursday that greater utilization of idle cement kilns to sinter iron ore is under consideration. (This development was mentioned in "This Industrial Week" in THE IRON AGE, April 22.) Tests are now being sponsored by the government to determine the value of creating additional charge for blast furnaces through this method.

Two American cement companies are now sintering iron ore fines for use by the steel industry. The Division has a list of cement kilns available for this work and is interested in learning the location of large quantities of waste materials from the manufacture of chemicals which may be so reduced to iron ore.

The Division's statement said:

"Many types of desirable ores are available as fine powders. These are obtained from certain mining operations and as by-products from chemical industries. The sintering process changes these ore dusts from powder to pellets, often driving off foreign matter to create an ore concentrate which is richer in iron content.

"As a blast furnace charge, sintered ore saves that portion of the iron ore ordinarily lost when air currents draw the fine powder out of the furnace. The chunky pellets eliminate this loss by remaining in the furnace. By allowing greater gas-solid contact, the irregularly shaped pellets reduce the fuel requirement and increase the rate of pig iron production at a given furnace.

"Approximately 30,000,000 tons of such processed iron ore will be required for war production next year."

How to Clear the Seas of Enemy Ships

• • • "To sink ships it is better to let water into them than air. The torpedo, dropped from the air at such height as would make a mass of junk out of a car or plane, contains 5000 parts which must take this beating and must then propel and control and explode this 'underwater hell-cat.' The torpedo must take and hold the exact depth set on the index to be effective—10 or 12 ft. for a destroyer or light cruiser but much deeper for a battleship.

"Depth bombs and depth charges must explode only a few yards away from the modern submarine to deliver a death blow, but serious and even disabling damage can be done at greater distances.

"Submarine torpedoes are very much like those used by aircraft, but are larger. They do not have to stand up against the blow due to dropping from a height and are discharged from the submarine's tubes in the bow and stern by compressed air. They can be shot either straight or in curves, the angle shots being accomplished by setting

the gyro for the final course, and then firing the torpedo with the rudder locked right or left until that course is reached, when the rudder automatically unlocks and the gyro takes control.

"The 6-in. guns of our modern light cruisers have no equal in the world for fast, accurate shooting and reliability. They are mounted in five 3-gun turrets and fire shells weighing slightly more than 100 lb. The 8-in. guns of the heavy cruisers, like the light cruiser 6-in., are also useful for shore bombardment. The shells have thin walls, correspondingly large explosive charges, and instantaneous impact fuses. The 16-in. caliber gun aboard a battleship is the most powerful engine of destruction used at sea. It weighs about 100 tons and hurls one-ton projectiles for more than 25 miles, traveling a half mile a second.

"While I called the big battleship guns the most powerful naval weapons, I did not say they were the most useful. The most useful, or at least the most used, are the

airplane bomb and torpedo, the submarine torpedo, the depth charge, and the anti-aircraft gun.

"The heaviest U. S. Navy anti-aircraft gun is the 5-in., with its accurate and rugged fire control system. For in-fighting the 20-mm. and 40-mm. guns are the most effective weapons. Both use explosive ammunition having sensitive contact fuses. The 40-mm. is mounted in twin or four-barreled mounts while the 20 is in singles and both are plastered all over the topsides of our ships. Together with the 5-in. batteries, the collection of these guns on each of our new big ships—battleships and carriers—constitutes the heaviest concentration of anti-aircraft guns in such a limited space found anywhere in the world."

—Rear Admiral W. H. P. Blandy, chief of the Navy Bureau of Ordnance, in an address recently before the Economic Club of Detroit.

The CMP FACT FINDER—A Quick Reference to CMP

The Iron Age Compiles Another Exclusive and Useful Tabulation of CMP Information

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How to Operate This Guide

• • • To locate detailed information on important phases of the Controlled Materials Plan simply refer to the item in question in this alphabetical index for the key to the exact CMP Regulation, paragraph or subparagraph in the officially published regulations or to news or analytical articles in THE IRON AGE.

(Reg. 1-c-1) means CMP Regulation No. 1, paragraph c, Subparagraph 1.

(I.A. 4-22-43, p. 99) means the April, 22, 1943 issue page 99 of THE IRON AGE.

A

AAA preference ratings (I.A. 12-3-42, p. 26; 2-4-43, p. 103)
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Adjustments on controlled materials obtained without allotments (Reg. 1-v)
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Allotment, Accounting Manual (I.A. 2-25-43, p. 102)
Allotment, Application for (Reg. 1-d-3)
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Allotment, definition (Reg. 1-b-5)
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Alternative use of PD-83 by warehouses (M-21-b-2(g))
Aluminum bars and shapes (I.A. 2-4-43, p. 103)
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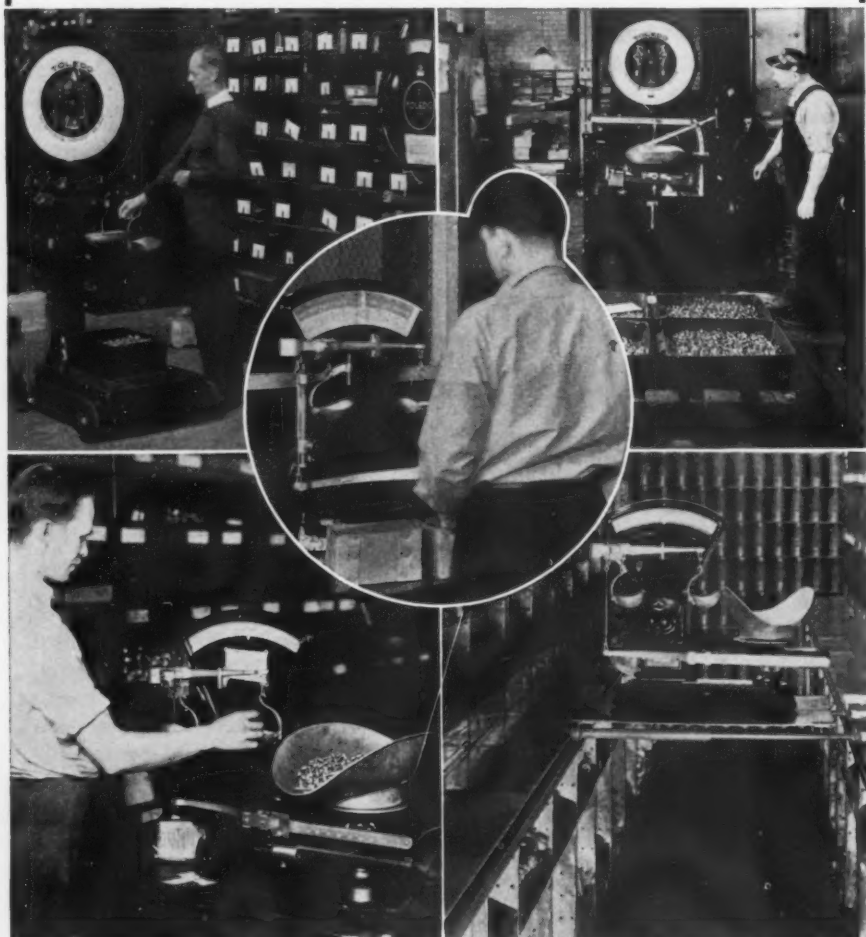
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The CMP FACT FINDER—Ready Reference to Full Texts of CMP

• • • A new approach to keeping up-to-date on CMP information has been developed by THE IRON AGE in the CMP Fact Finder—a quick reference to full texts of CMP orders which helps you to place your finger on the exact place the information appears. A few weeks ago THE IRON AGE published the exclusive CMP Simplifier which gave brief, concise information on all phases of CMP under an alphabetical listing. Realizing that there is frequent need for more than abbreviated information, the CMP Fact Finder has been developed to

refer you to the exact paragraph in CMP Regulations where full texts of the subject matter are set forth. To increase its usefulness, the CMP Fact Finder also contains references to the new warehouse orders M-21-b-1 and M-21-b-2 and keys to stories clarifying CMP which have appeared in THE IRON AGE since inception of the plan. Truly a useful, valuable reference you may want to clip the pages for your desk as a handy guide to all pertinent questions on the Controlled Materials Plan.

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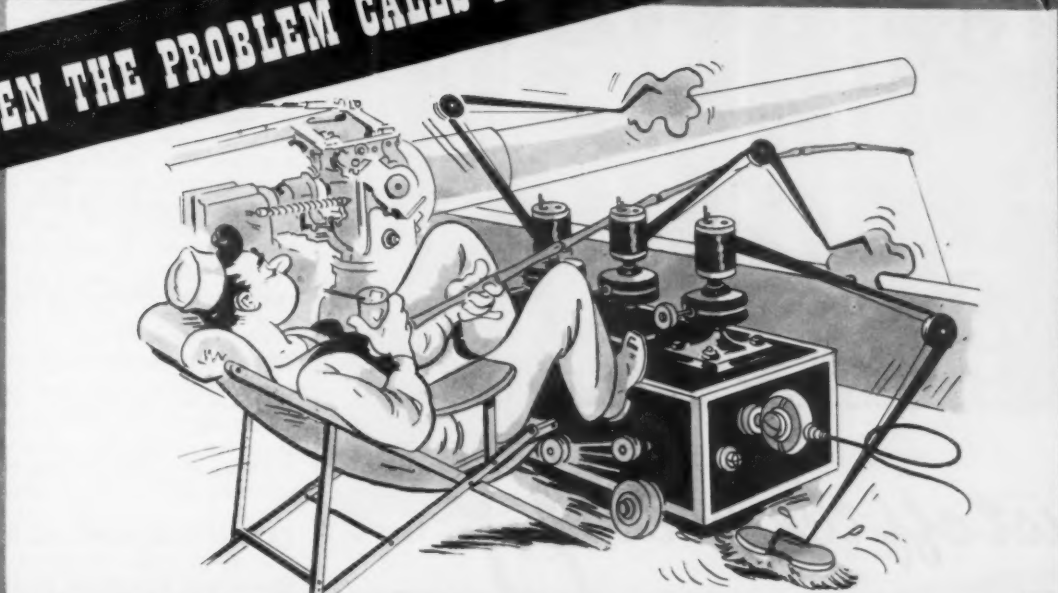
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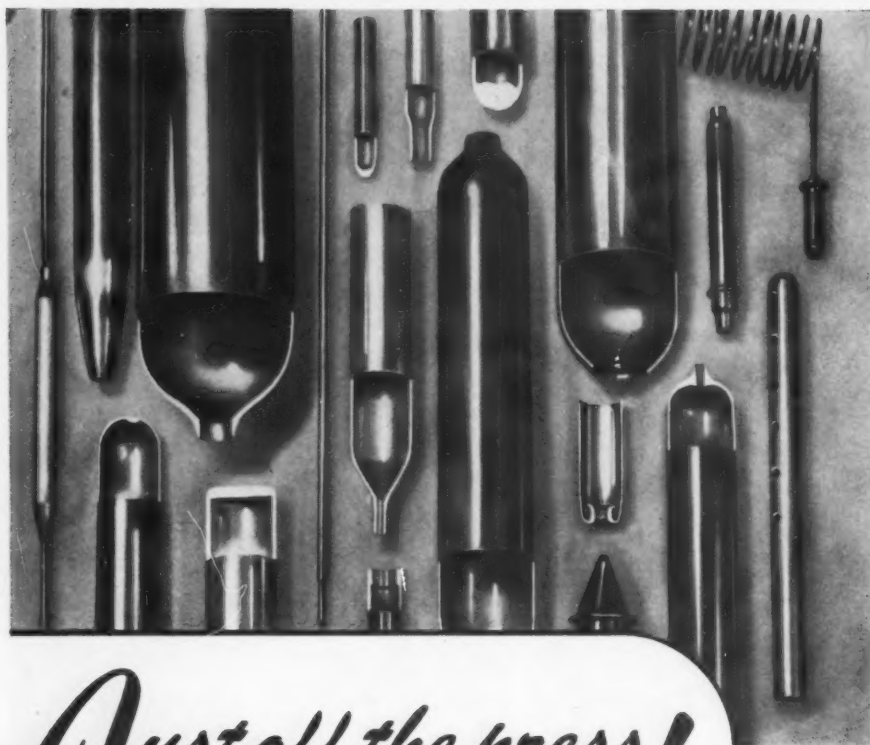
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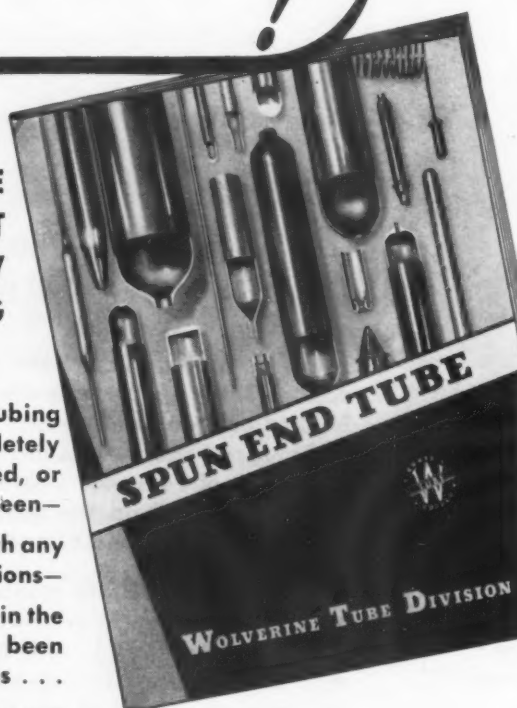
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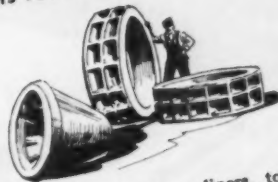
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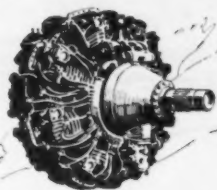
PARTS FOR — RAILWAY EQUIPMENT

Brake shoes, lockkeys. Chilled tread car wheels. Car and locomotive wearing parts. Axle or journal bearings.

PARTS FOR — POWER PLANTS



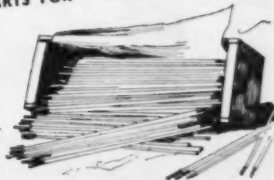
Ash handling pumps. Manganese steel pulverizer and grab bucket parts. Alloy steel superheater parts.



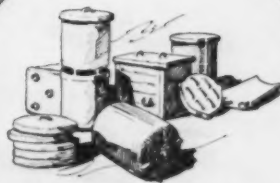
PARTS FOR — PLANE ENGINES

Forgings for cylinder barrels, crank shafts and connecting rods. Bearings for starter and camshafts, fuel pumps.

PARTS FOR — WELDING



Welding products for reclamation, hard surfacing and repair of ferrous equipment parts. Welding rods, flux.



PARTS FOR — HEAT TREATING

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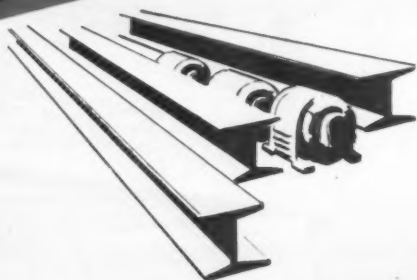
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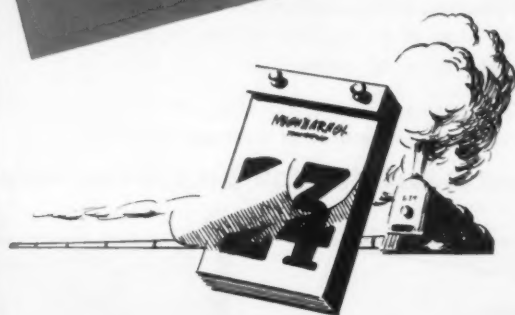
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Today *these 4 fundamental facts dictate the specification of Atmospheric Aerator Type Cooling Towers*

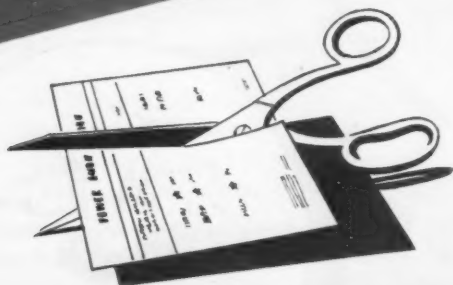
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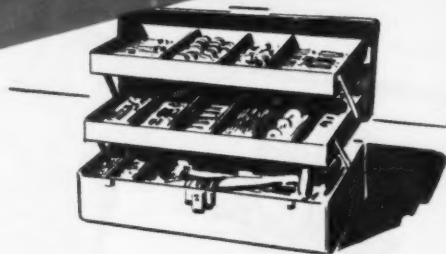
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FLUOR BUILDS both Atmospheric Type Cooling Towers and Mechanical Draft Cooling Towers. To those concerned with the specification of a cooling tower, Fluor is ably qualified to give unbiased counsel in the selection of the type of tower best suited for cooling process water, for any service, in any location, in any quantity.

Fluor believes that today, *under War conditions*, the specification of an Atmospheric Aerator Type Cooling Tower is dictated by the following four fundamental facts which make substantial contributions to the war effort.

Fact No. 1. An Atmospheric Aerator Cooling Tower uses fewest critical components. Your specification of an atmospheric tower means that steel, brass, aluminum, motors, fans, gears, switches, conduit and other hard-to-get materials, essential to the Mechanical Draft Types, are released for critical armament uses, as are the thousands of man-hours required for their manufacture, assembly and shipment.

Fact No. 2. An Atmospheric Aerator Cooling Tower can be delivered faster, — often three times quicker than towers of the Mechanical Draft Type. Because the production of critical

components for Mechanical Draft Towers is wholly or in greater part in the hands of sub-manufacturers, the final delivery of a Mechanical Draft Type is dependent on these sub-manufacturers. On the other hand, the manufacture of an Atmospheric Aerator Type Cooling Tower is controlled by Fluor. Throughout the whole defense and war program Fluor has never failed to meet or beat scheduled delivery dates. This record will continue; Fluor is geared to do it.

Fact No. 3. An Atmospheric Aerator Cooling Tower costs less to operate, because it requires least horsepower. There are no fan motors to operate. Here again, power, essential to war industries, is conserved to relieve the power shortage.

Fact No. 4. In an Atmospheric Type Tower, maintenance costs are negligible. Mechanical devices, such as motors, gears and fans, in a Mechanical Draft Type Tower require attention, —entail costs in both operation and upkeep. Maintenance like this and the man-power attendant to it, are eliminated with the specification of an Atmospheric Aerator Cooling Tower.

On the basis of the above four facts, the only limiting factors making the specification of Mechanical Draft Towers



mandatory are (1) lack of space for the erection of the Atmospheric Type and (2) extremely subnormal wind conditions. You may ask, "How can we be certain that a Fluor Atmospheric Aerator Cooling Tower is the absolute correct specification under any conditions?"

Fluor Engineers will gladly give specific, unbiased answers to this question after analysis of your problem. Since Fluor makes all types of cooling towers our thinking is completely independent. If analysis shows that the Mechanical Draft Type Tower is the answer to your problem, Fluor will cooperate by furnishing expert documentary evidence of essential need as a means of assisting you in obtaining the necessary directive.

These, then, are the facts why Fluor recommends your specification of Atmospheric Aerator Type Cooling Towers for the duration. Wire or airmail your inquiry for prompt action. *Be Sure with Fluor.*

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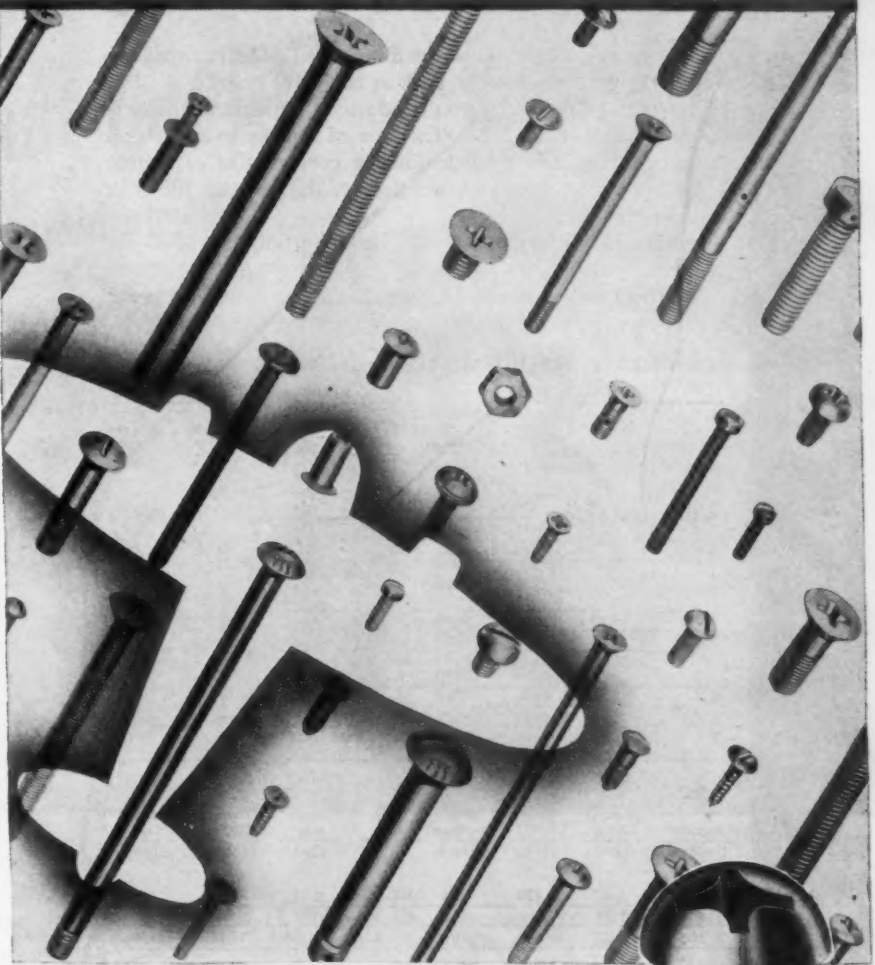
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Precision AIRCRAFT fastenings



HOLTITE Aircraft Screws, Bolts and Nuts are scientifically designed, produced and inspected to meet the most rigid A N and A C specifications. Adopted by the Aircraft Industry for use in every part of America's fighting and transport planes these precise, rugged fastenings are skilfully made of selected, pre-tested materials. HOLTITE Aircraft Fastenings are accurately gauged and inspected at each stage of manufacture by specially trained inspectors. Heat treating, plating and other finishes are in strict accordance with A N and A C specifications.

HOLTITE "Thread-Forming" SHEET METAL SCREWS

When Speed Nuts are used with HOLTITE Sheet Metal Screws, the small, tapered point permits a quicker start and run-on of nut. The smooth threads with faster lead reduce nut-turning time and provide a much tighter lock to resist vibration.

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● If shortages of small and medium sized Manila ropes are retarding your production look at the table below.

Select the size of rope you need which appears in the left-hand column. Then follow the line of figures to the right. You'll find it easy to pick out the correct size of **TENSO**, **LOCK LINK** and **NIAGARA** weldless chain for the job you have in mind.

Additional information will be cheerfully supplied on request.

Will you please remember, when placing your orders for chain, to supply the highest preference ratings obtainable.

COMPARISONS VARIOUS WELDLESS CHAINS TO MANILA ROPE

MANILA ROPE				TENSO WELDLESS CHAIN			
Diameter (Inches)	Weight 100 ft. (Lbs.)	*Federal Spec. TR-601a (Lbs.)	*Plymouth Wartime (Lbs.)	Trade Size	Diameter (In.)	Weight 100 ft. (Lbs.)	Break Test (Lbs.)
3/16	1.37	420	336	No. 3	.08	5.75	375
1/4	1.71	550	440	No. 2	.0915	7.50	430
5/16	2.52	950	760	No. 1	.1055	10.00	785
3/8	3.45	1275	1020	No. 1/0 or No. 2/0	.1205	13.00	1000
7/16	5.15	1750	1400	No. 4/0	.162	23.00	1500
15/32	6.14	2250	1800	No. 5/0	.177	26.00	1850
1/2	7.36	2650	2120	No. 6/0 Spec.	.192	37.00	2105
9/16	10.20	3450	2760	No. 8/0	.2253	47.00	2850
5/8	13.10	4400	3520	No. 9/0	.2437	55.00	3355
3/4	16.40	5400	4320	No. 10/0	.2625	67.00	4525

MANILA ROPE				LOCK LINK WELDLESS CHAIN			
Diameter (Inches)	Weight 100 ft. (Lbs.)	*Federal Spec. TR-601a (Lbs.)	*Plymouth Wartime (Lbs.)	Trade Size	Diameter (In.)	Weight 100 ft. (Lbs.)	Break Test (Lbs.)
3/16	1.37	420	336	No. 4	.072	6.00	405
1/4	1.71	550	440	No. 3	.080	7.00	495
5/16	2.52	950	760	No. 1	.1055	13.00	940
3/8	3.45	1275	1020	No. 1/0	.1205	17.00	1055
7/16	5.15	1750	1400	No. 2/0	.135	22.00	1545
15/32	6.14	2250	1800	No. 4/0	.162	29.00	1915
1/2	7.36	2650	2120	No. 5/0	.177	34.00	2440
9/16	10.20	3450	2760	No. 6/0	.192	41.00	2940
5/8	13.10	4400	3520				
3/4	16.40	5400	4320				

MANILA ROPE				NIAGARA WELDLESS CHAIN			
Diameter (Inches)	Weight 100 ft. (Lbs.)	*Federal Spec. TR-601a (Lbs.)	*Plymouth Wartime (Lbs.)	Trade Size	Diameter (In.)	Weight 100 ft. (Lbs.)	Break Test (Lbs.)
3/16	1.37	420	336	No. 4	.072	4.75	420
1/4	1.71	550	440	No. 3	.080	5.75	505
5/16	2.52	950	760	No. 1/0	.1205	13.50	1130
3/8	3.45	1275	1020	No. 2/0	.135	17.00	1370
7/16	5.15	1750	1400	No. 3/0	.1483	20.25	1675
15/32	6.14	2250	1800	No. 4/0	.162	25.00	1845
1/2	7.36	2650	2120	No. 5/0	.177	30.00	2220
9/16	10.20	3450	2760	No. 7/0	.207	40.00	3100
5/8	13.10	4400	3520				
3/4	16.40	5400	4320				

*Minimum Breaking Strength

AMERICAN CHAIN DIVISION

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☆ *IF* all welding electrodes of the same type were exactly alike, or even very similar, there would be no question as to which to buy.

But welding electrodes are *not* alike. They are not even "very similar." We know this to be a fact, for we spent several hundred thousand dollars to discover it. Our laboratory and shop tests reveal with definite finality that the price per pound of electrodes does *not* determine the *material* or the *time cost* of welding. Both of those figures are governed by what you get from electrodes—not what you pay per pound.

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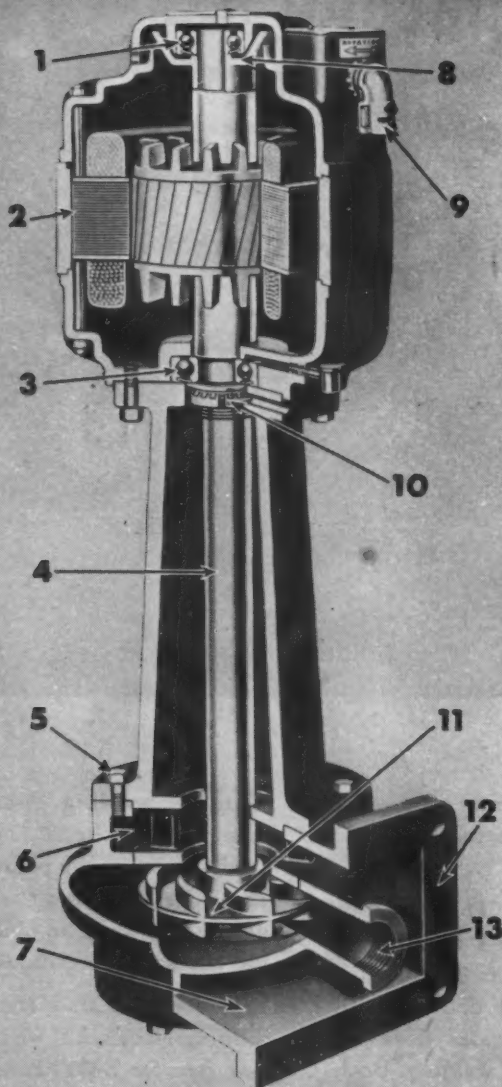
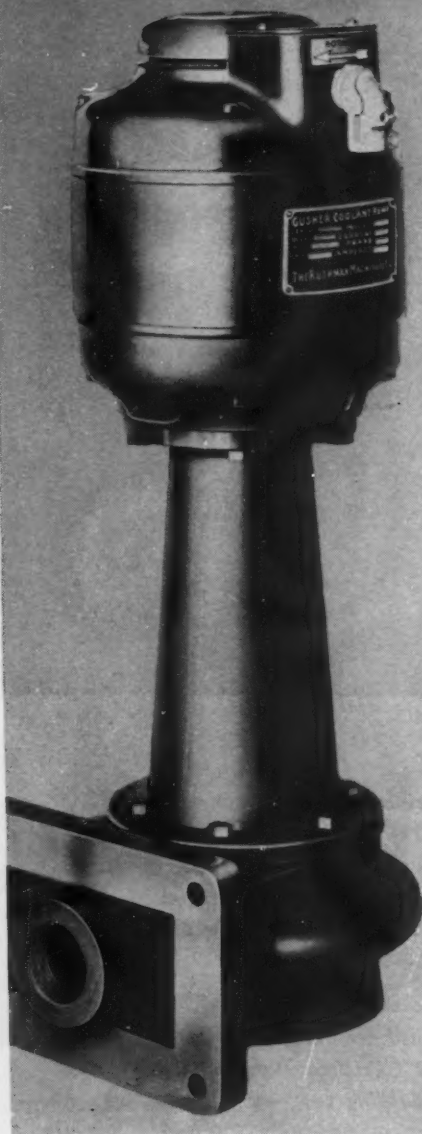
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Gusher Coolant Pumps

THE OUTSTANDING COOLANT PUMP TODAY—



FEATURES

- 1 precision ball bearing
- 2 standard interchangeable stator
- 3 precision ball bearing
- 4 rigid one-piece shaft
- 5 removing these screws permits lifting pump and motor assembly for inspection
- 6-7 twin intakes are automatically cleansed when pump is throttled
- 8 internal louvers and revolving cup disc protect motor
- 9 conduct wiring connection
- 10 centrifugal lock nut and seal prevent moisture from reaching bearing
- 11 double acting impeller
- 12 heavy mounting flange cast in one piece with impeller housing
- 13 internal discharge thru center of intake eliminates outside piping

Quite a number of machine tool builders equip their new machines with Ruthman Coolant Pumps. Machine tool builders have doubled their output each year for the past 3 years. And yet even this favorable situation doesn't explain why so many Ruthman Coolant Pumps are made and sold.

Users of machine tools—appreciating the trouble-free performance of Ruthman pumps—have stepped in and bought Ruthmans as replacements for other coolant pumps. And when they replace with a Ruthman Coolant Pump it's the last replacement they'll have to make.

RUTHMAN MACHINERY COMPANY
CINCINNATI, OHIO

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Silicon, balance Iron.

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You must have strength in an anti-aircraft gun carriage — strength to resist the shock of recoil, the rough treatment imposed by rugged terrain, the strenuous service of combat conditions. The equipment must not fail.

The material for each part must be selected carefully to give the utmost in strength for this vital task of warding off death from the skies.

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You find Ampco bronzes used in Army and Navy ordnance, in aircraft, in marine service — wherever there is need for an alloy that can "take it." For your war work, where bronzes meeting Government specifications are used, there is a grade to meet your requirements and to deliver results that are creditable to you.

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DEPARTMENT 1A-6

MILWAUKEE, WISCONSIN

AMPCO METAL



THE METAL WITHOUT AN EQUAL

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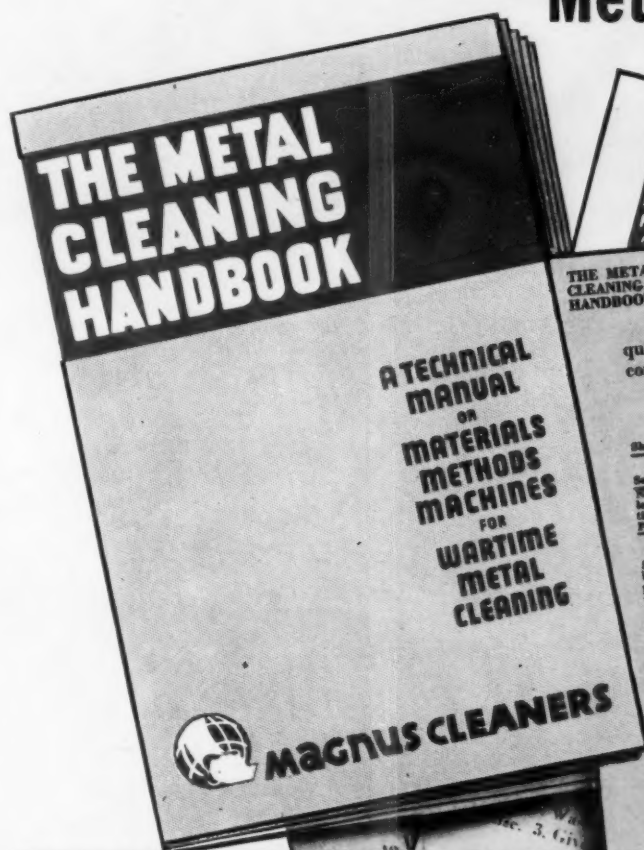
New Canadian Blast Furnaces To Be Started in Near Future

Toronto

• • • Algoma Steel Corp. Ltd., has practically completed its new plant installations started in 1941, representing an expenditure of approximately \$14,000,000. The blooming mills and some other rolling departments were completed and put in operation some time ago, leaving the new blast furnace and coke oven still to be completed and blown in. The new blast furnace, on which installation has been held up owing to difficulty in obtaining equipment deliveries, will be the largest stack in Canada, with a rated capacity of 1000 tons per day. While officials are not definite as to the date this furnace will be ready to blow in, it is expected that it will commence production some time next month. On the completion of the new stack Algoma Steel Corp., will have five blast furnaces.

Dominion Steel & Coal Corp., also is completing installation of a new blast furnace at its Sydney works, to have rated capacity of approximately the same as the new stack at Algoma Steel Corp., which is expected to be ready for production within the next few weeks.

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ANSWERS TO YOUR FINISHING PROBLEMS

Selecting Alkaline Cleaners
Cleaning After Buffing
& Polishing
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Operations

THE METAL CLEANING HANDBOOK

quite general. But they serve the purpose of breaking down a complex picture into one with some degree of simplicity.

TABLE A — Small Parts

Shape	Parts and units in this Class	Recommended Cleaner	Handling of the Parts	See Figure No.
Solid	Threaded or machined parts — Bolts — Nuts — Screws — Washers — Ribs and machine screws — Armored parts — Bolted covers — Stamped and formed units — Hardware.	Alkaline Cl. or Emulsifiable Agent	In bulk or in baskets On racks or in baskets	1-2-3a 8-10 4-6-11-12
Some but not all Fragile	Unfinished small fire arms parts — Small cartridge cases and rounds — Rough castings and stampings — Unfinished hardware and pipe fittings.	Alkaline Cl. Solvent	In bulk In baskets	2-3a 5-9 10
Hollow or with deep recesses Fragile	Hollow tube parts — Primer caps — Small metal boxes or containers — Gas mask parts — Deep drawn parts — Finished shell cases.	Alkaline Cl. or Emulsifiable Agent	Individual On rack In baskets	2-2 1-6-13 10
Some but not all Fragile	Draws of shell and cartridge cases — Grenade cases — Encased parts — Cylinders — Lamp cases — Searchlight parts — Muzzle — Valve and cock bodies — Fittings.	Alkaline Cl. or Emulsifiable Agent	Individual or in baskets	1-3-3a 4-3 6-9-7 10

TABLE B — Medium Size Parts

Solid	Mechanical, motor engine parts for airplanes — tanks — tanks — Household apparatus parts — Motorcycles.	Alkaline Cl. or Emulsifiable Agent	In bulk Individual In baskets	1-3-3a 1-3-3-3
Some but not all Fragile	Medium size shells and steel cases — Castings — Tubes — Deep drawings.	Alkaline Cl. or Emulsifiable Agent	Individual or in baskets	2-4-5-9-11-13 10
Hollow or with deep recesses Fragile	Same as above — Cylinders — Containers — Mine cases — Bomb bodies — Rough draws or castings.	Alkaline Cl. or Emulsifiable Agent	Individual or in baskets	2-4-5-1-3 10

TABLE C — Large Parts

Solid	Mechanical, automobile, chassis parts — Aircraft parts — Warship tool parts — Wheels — Frames.	Alkaline Cl. or Emulsifiable Agent	Individual	1-3-3a-4
Some but not all Fragile	Milk cans — Drums — Large containers — Motor and pump bodies — Gun barrels.	Alkaline Cl. or Emulsifiable Agent	Individual	1-3-3a-5-19

TABLE D — Large Bodies and Assembled Units

All types	Auto, truck, airplane tank bodies — Tank armor plates — Gun turrets and mounts — Turbines.	Alkaline Cl. or Emulsifiable Agent	Individual	14-15
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ON THE BATTLE LINE**

ABLE TO TAKE IT--

**IN THE TOOL ROOM OR ON
THE PRODUCTION LINE**

Built to "dish it out" and take it, too, Uncle Sam's tanks demand tough materials and skilled design to give them stamina and striking power.

The same principles hold for milling machines—the machine tools that are mighty important in building tanks and other weapons. In tool room or on the production line, milling machines must be built to perform at a record-breaking pace and maintain close tolerance-accuracy in operation.

The center bearing on the spindle of Milwaukee Milling Machines reduces by one-half the distance between bearings—*increases rigidity eight times!*

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KEARNEY & TRECKER

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MILWAUKEE, WISCONSIN



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"Breaks"

**LIKE THIS
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FOR PRODUCTION**

Broken tools—mechanical troubles — caused by improper care and operation of machine tools, are no help in production for Victory. Practically every machine tool manufacturer offers valuable advisory service — "care and operation" handbooks — technical bulletins — on better methods of operation that help green men as well as speed and improve production of skilled workers.

Put full information in the hands of the men who operate your machine tools — teach them the "know how" to get the most in production with the least waste of time, effort and materials.

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Many shop training directors report unusually successful results with this visual course. It is available on a rental basis at nominal cost. We invite you to write for full information to our Department of Industrial Education.

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Milwaukee, Wisconsin

Briefly Told—

American Great Lakes Ore Boats in Service Total 306 of 309 Available

• American Great Lakes ore vessels in service on May 15 totaled 306 of the 309 boats in all fleets. However, only 279 of these vessels were carrying ore. The remainder were in other services such as carrying grain. Except for the Hutchinson & Co. fleet, which has 32 of its 35 boats in operation, all of the 27 shipping companies are operating all of their boats.

• A total of \$244,893,000 in prime war supply contracts awarded in Ohio, Kentucky, West Virginia, and western Pennsylvania during the week ending April 30 gave that region the heaviest week of new business that it has had in six weeks, and the second largest dollar volume of contracts awarded in 25 weeks.

• Substitution of hot-finished for cold drawn seamless steel tubing is suggested by the Seamless Steel Tube Institute as a means of increasing output of tubing to meet the demands of essential war needs. This recommendation covers the larger sizes, with heavier walls.

• The total volume of construction activity in the United States amounted to \$730,584,000 in March, WPB announced recently. This was five per cent less than February, and 23 per cent under the figure of March, 1942. Total amount of construction work during the first quarter of 1943 was \$2,318,555,000, an 8 per cent decrease from the total of the first quarter of 1942.

• The American Gas Association has authorized a new research project with the following objectives: to establish the effects of high-speed, direct heating with modern gas-air combustion on the metallurgical, working and production properties of ferrous and non-ferrous metals (both standard and NE types) as heated for forging, normalizing, annealing, hardening, drawing, rolling, etc.; to compare these effects with conventional furnace heating, and electric induction, and to study their relative merits.

• The Association of American Railroads announced recently that Class I railroads had 34,262 new freight cars on order on May 1. On the same date last year they had 59,328. The number on order this year included 3500 plain box; 2525 automobile box; 7739 gondolas; 18,481 hoppers; 200 stock and 1817 flat cars. Railroads also had 893 new locomotives on order which included 394 steam, nine electric and 490 Diesel locomotives.

• W. Carson Adams, wholesale coal and coke dealer, has been elected chairman of the Birmingham district chapter, American Foundrymen's Association, succeeding E. A. Thomas, president of Thomas Foundries, Inc.

• More than 7000 items of used construction machinery with an estimated value of \$60,000,000 have been supplied for construction jobs during the past six months through the inventories of used construction equipment set up in the WPB's 12 regional

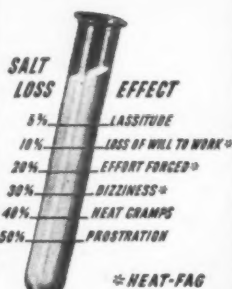
Trigger Fingers... Must Not Fail

From the stink holes of the Solomons and the burning sands of Africa to the industrial heart of America, salt tablets play their part in preserving the will to win and the will to work. Whether power tool or rifle, trigger fingers must not fail. Men must stay alert and on the job.

Wherever men sweat, Heat-Fag is a threat. Sweat dissipates body salt. Unless body salt is replaced and the correct balance maintained, Heat-Fag takes its toll. It slows down reactions — renders men inalert — exposes them to industrial accidents.

Production-minded industries insist on Salt Tablets for men who sweat and do hot work. They keep men alert and efficient through long, hard, hot hours.

This Is What Happens When Sweating Robs the Body of Salt . . .



MORTON'S
Heat-Fag
SALT TABLETS



QUICK DISSOLVING (Less than 30 seconds)

This is how a Morton Salt Tablet looks when magnified. See how soft and porous it is inside. When swallowed with a drink of water, it dissolves in less than 30 seconds

Case of 9000, 10-grain Salt Tablets, \$2.60
Salt-Dextrose Tablets case of 9000, \$3.15

Order from your distributor or directly from this advertisement . . . Write for free folder.

Place MORTON'S DISPENSERS at all Drinking Fountains.

They deliver salt tablets, one at a time, quickly, cleanly — no waste. Sanitary, easily filled, durable.

500 Tablet size - \$3.25
1000 Tablet size - \$4.00



MORTON SALT COMPANY • CHICAGO, ILLINOIS

offices, the construction machinery division announced recently. The utilization of this machinery has saved a corresponding amount of new equipment representing some 120,000 tons of raw materials.

Chairman Donald M. Nelson announced that the results of one year's operation of the labor-management production committees sponsored by WPB "show convincingly that this approach to the problem of increasing production is sound and extremely effective."

A total of 86,922 suggestions were turned in by war workers of General Motors in the first year of operation of the corporation's suggestion plan to increase war production. The number of these suggestions is increasing each month and their quality is improving so that at present more than one out of every five is being put into effect. C. E. Wilson, president of General Motors, announced recently.

Presenteeism records are being set at the Western Gear Works, Seattle. April attendance was 95.6 per cent; during the first 20 days of May, 96.4 per cent. Daily records of 100 per cent presenteeism are frequently in effect on the various shifts. One feature of the plan to reduce absenteeism is a chart posted beside the time clock.

WPB cut-off of facilities affected Toledo recently when operations were reported ordered halted in the still unfinished five-million-dollar liquid-cooled engine plant of Aviation Corp. This stoppage came just six days before the scheduled dedication of the new plant together with a preview of it and its equipment for manufacture of engines for the Army and Navy. There is no immediate word whether these liquid cooled engines, said to be of the highest horse power yet produced in volume, would be manufactured anywhere else.

American bombers can fly higher into the stratosphere and stay there longer as a result of a new chemical development disclosed recently by the Westinghouse Research Laboratories, Pittsburgh. The discovery adds about 50 times the high altitude life of carbon brushes in airplane generators.

On May 10, production of clinkered, or double-burned dolomite, was begun at the new kiln DPC plant of the Basic Refractories, Inc., of Cleveland. The new kiln was designed and built to supplement the company's capacity for the manufacture of its basic refractories—Magnefer, Syndolag and other clinkered dolomite products, needed by the steel industry.

A special machine for testing projectile fuse springs has been developed by American Steel & Wire Co. engineers. Formerly a hand operation, the machine will test, sort, and classify springs, according to length, load capacity, and deflection, at the rate of 2500 an hour. Loaded into



OLD TIMER!

Case history of a veteran length of Bus Duct

In the middle '30's this section of Bus Duct was on a peacetime job—feeding power to big punch presses.

Then Pearl Harbor plunged the plant into war work. Down came the Bus Duct—transferred to a line of milling machines in another department.

A few months later the whole production set-up was revised again. Presto!—this veteran section moved to a new assignment.

Only a wrench and a screwdriver were needed to make these changes. No parts were bent or cut. Nothing was sacrificed.

On top of the time and maintenance cost it saves—on top of its greater all-around adaptability—modern Bus Duct has this big advantage over old-fashioned distribution systems:

It is 100% salvable!

Today, this veteran Bus Duct section is as good as ever—ready to serve the production needs of war or peace for many years to come.

BUY MORE WAR BONDS

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THESE
SECTIONS
EASILY
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LEG-OUT



LEG-IN



ON-FLANGE



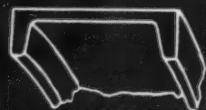
ON-WEB



FLANGES-OUT



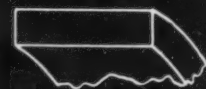
FLANGES-IN



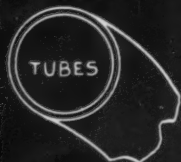
ON-EDGE



ON-FLAT



TUBES



PIPES



Bending
ON SCHEDULE



all types of CIRCLE, SEGMENT AND SPIRAL FORMS

A GLANCE to the left shows the wide range of stock which can be handled rapidly and accurately by a Buffalo Bending Roll—and explains why metal bending output need never lag! Even unskilled labor can be put on these husky, easy-to-control machines, with full confidence that schedules will be met, and with a minimum of rejects. Full engineering data on Buffalo Bending Rolls for aircraft and general fabricating application will be sent promptly on request. In writing, please state the size, shape and material to be handled.



BUFFALO FORGE COMPANY

492 Broadway

Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.



"Buffalo" BENDING ROLLS

NEWS OF INDUSTRY

small holes in a metal dish, the springs are placed in the machine where they are subjected to a series of tests.

• At the Harrison, New Jersey, laboratories of National Oil Products Co., the completion of exhaustive tests have resulted in the development of a series of metal cutting oils that are definite improvements, not reproductions of existing products. The oils in this new group are known as Vegicut A and Vegicut B, low and medium viscosity oils; Vegisol, and emulsifying cutting oil readily soluble in a wide range of waters; and Vegisulph, a sulphurized product providing maximum anti-welding protection. The new oils are recommended for use on practically all metals, for cutting and machining operations.

• Smaller War Plants Corporation has set up a Detroit regional office covering all of Michigan and Lucas County (Toledo) in Ohio. Thomas W. Moss, former Chrysler official, was named regional chief. A board of directors composed of business men in the area was also named. Representatives of business in Toledo, Grand Rapids and the Saginaw-Bay City area will be added to the board, according to Moss.

• The new 21-acre windowless blackout bomber plant operated by the Douglas Aircraft Corp., Tulsa, Okla., has a mammoth air processing equipment which has a refrigerating capacity of 7000 tons a day. In a 24-hour period it will remove enough heat from the 21-acre interior of the plant to melt almost 6½ acres of ice a foot thick. A battery of seven turbo water cooling systems chill more than 13,000 gallons of water a minute from a temperature of 59 degrees to 47 degrees.

• Chemicals to clean, surface-harden, electroplate, pickle and perform other necessary operations on the metal are being manufactured in record quantities this year to match the unprecedented output of steel. E. I. du Pont de Nemours & Co. reported recently. Every piece of steel going into ordnance must be thoroughly cleansed of oil and grease, before it takes final form. Both satisfactory inspection and the permanent adhesion of any finish require perfectly clean metal.

• A representative sample survey of the nation's small manufacturing concerns, published recently by the Office of War Information, indicates that 58 per cent are engaged directly or indirectly in war production. Of the remaining 42 per cent, about one-quarter have been unable to get war production contracts and about three-quarters have not tried to get war contracts because their products were not required for war, or they had enough civilian business.

• Bureau of Mines field crews recently completed a three-year exploratory project in the famed Stillwater chromite area of Southeastern Montana—an undertaking which aided extensive commercial development of deposits estimated to contain 2,500,000 tons of chromium ore valuable for armor plate, airplane engines, projectiles, and other essential war equipment.

• The Bridgeport, Conn., plant of Jenkins Bros. has created a special night shift from 6 to 11 p.m., Monday through Friday for white-collar workers employed in the daytime. Ac-

Where Bearings
"Get The Works"

SUN H. D. LUBRICANTS

"Do a Job"... Under Pressure, Heat and Water

In one of the country's largest steel mills, now turning out materials for tanks, guns and ships, Sun Heavy Duty Lubricants are helping to keep equipment on the job and producing at top speed.

For many years operators in this plant thought expensive lead soap and graphite greases were necessary for lubricating the roll neck bearings of blooming mills. But this practice was soon abandoned when Sun Engineers—those Doctors of Industry—recommended Sun Heavy Duty Pressure Grease. Now these lubricants stand up under extreme pressures, high heat, and water constantly flooding the rolls. Bearings show little or no signs of wear . . . lubricant does not wash off . . . and

lubricant lines are never clogged as was often the case with products previously used.

Today, in this plant Sun Lubricants are standard throughout . . . in pressure systems or hand lubricated installations . . . from bar mills to conveyors. Whether you operate a steel mill or a textile mill . . . a machine shop or a munitions plant there's a Sun Lubricant to meet your requirements. And Sun Oil Engineers always stand ready, willing, and able to help you help America with more production. Write . . .

SUN OIL COMPANY, Philadelphia

Sun Oil Company, Limited, Toronto, Canada

SUN PETROLEUM PRODUCTS



HELPING INDUSTRY HELP AMERICA



REX-WELD

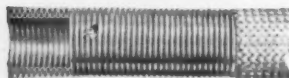
Helps Guard

HIS LIFE

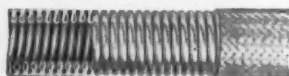
REX-WELD Flexible Metal Hose has met the critical test that demands only the best materials for our combat planes. More and more bombers, fighters and interceptor-pursuit ships are being Rex-Weld equipped.

REX-WELD's war service is not confined to the planes themselves. In the steel mills and munition factories, on the production and assembly lines, everywhere that war-worthy flexible connections are needed, REX-WELD is rendering vital service.

There are specific reasons for this. REX-WELD is a specially constructed flexible metal tubing. It is fabricated from strip



Type RW-81
(annular corrugations)



Type RW-91
(helical corrugations)

metal by a precision autogenous welding process that produces uniform, stronger wall structure plus extreme flexibility. REX-WELD stands up under high pressures, high and low temperatures, extreme contraction and expansion. It is seep-proof to gas, water, oil, air and searching fluids.

Available in continuous lengths to 50 ft. Both Steel and Bronze. 3/16" I. D. to 4" I. D. inc. Pressures to 14,500 p.s.i. Temperatures to 1000° F.

Write for Engineering Recommendations

CHICAGO METAL HOSE CORPORATION

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NEWS OF INDUSTRY

cording to Bernard J. Lee, vice-president, the shift has become quite successful. Men on the new night shift include bankers, brokers, attorneys, business executives and salesmen.

• The new brick and clay plant being built by General Refractories Co., Philadelphia, at Troup, Texas, is expected to be in production late this summer. Complete and modern in all details, the plant will be operated all year round. At the outset about 100 tons of clay will be made into firebrick daily.

• A new all-color sound movie, "The Inside of Atomic-Hydrogen Arc Welding," is announced by the General Electric Co. to help in the training of welding operators. Produced by the Raphael G. Wolff Studios, Hollywood, new film employs colorful charts, animation, actual demonstrations, close-ups of the "singing" atomic-hydrogen arc in action, as well as examples of good and bad welding. The films are 10 min. in duration and can be used on sound-equipped 16-mm projectors only.

• How the benefits of power brushing can be further extended to help produce the materials of war, was the theme of a recent 3-day conference of 28 field representatives of the brush engineering staff and home office executives of Osborn Mfg. Co., Cleveland, world's largest producers of power-driven brushes for industry. In commenting on the results of the meetings, M. C. Pecsok, Osborn executive, pointed out that results obtained in a number of brushing applications showed speed increases as high as 700 per cent.

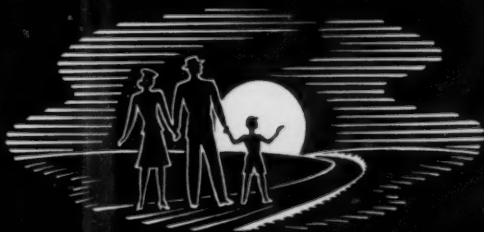
• During the last five months the Allegheny Ludlum Steel Corp. has had a job methods training course in operation for foremen in the company's Brackenridge, Pa., mill. One of the principal results of the course was a flood of recommendations for future procedures in methods of production. It is on record at the Brackenridge plant that fully 25 per cent of the total number of recommendations made, suggesting innovations in methods, were accepted and placed in practical operation.

• The "Thomas Wilson," first of the new boats built by the Maritime Commission, completed its first round trip in ore service on May 20, bringing 14,120 tons of ore from Duluth to Cleveland. The boat was placed in service with the Wilson Transit Co. fleet, and made the trip in a few hours over six days. The remaining ore boats on Maritime Commission order are being built by the Great Lakes Engineering Co., at Ecorse, Mich., and Ashtabula, Ohio.

• The efforts of victory gardeners to protect their plots from the depredations of dogs, rabbits and other civilians is creating a very tight situation in fencing and netting, jobbers report.

• Figures just released by the Industrial Truck Statistical Association, Chicago, indicate that domestic bookings of electric industrial trucks and tractors during the month of March totalled 346 units.

• The Buffalo area aviation plants



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... your way of life! Every man interprets it a little differently, but to us all it means a car, a radio, a refrigerator; the right to those things that make our daily life pleasanter, more convenient, more exciting. Today Weatherhead plants are producing vital parts for planes, tanks, ships, trucks and munitions at the rate of *millions every twenty four hours*. The coming of Peace will find us prepared to join with you in building the durable goods all the world will want from America as well as many strange new devices that are even now being born in the war.

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of Bell, Curtiss-Wright and Chevrolet now have 88,000 workers on their payrolls, a number far greater than ever was visioned even after the outbreak of war. Censorship forbids a plant-by-plant breakdown.

• Eight hundred pounds of stainless steel plates from a Pittsburgh mill helped to avert an extended shutdown of high octane aviation gasoline production in a Texas plant recently. The needed material, stainless plates to repair a cracking unit in the gasoline plant, was located immediately at Wood Works, one of the company's district plants. The order division cleared the release of the steel with WPB by telephone and arranged with ODT for shipment by an Army cargo plane. The plates were in possession of the customer within 48 hr.

• The 17th Eastern Photoelasticity Conference and Experimental Stress Symposium was held at the Rackham Building, Detroit, under the auspices of the Chrysler Institute of Engineering. The chairman of the Detroit committee in charge was Dr. C. Lipson of Chrysler Corp. A variety of papers were read dealing with stress analysis, particularly in war products.

• Hunt Grinding Co., a producer of materials for the Navy, is increasing its output by adding white collar workers to its shift during evening hours. Girls are employed on day shifts at the grinding concern and business men, mostly salesmen, make up the night shift.

• Instead of "pulling a button" to test spot welds, Westinghouse Electric & Mfg. Co. has developed a shear testing machine that indicates the force applied in lb. on a gage necessary to destruct the weld. The method gives a quantitative value of the weld strength, and a quick check on the setup of a spot welded.

• The total volume of construction activity in the United States amounted to \$730,584,000 in March, according to the WPB. This was 5 per cent less than February and 23 per cent under the figure of March, 1942. The total amount of construction work put in place during the first quarter of 1943 was \$2,318,555,000.

• The Eclipse Counterbore Co., Detroit, by intensive concentration on the production of one type of end cutting tools, has devised in the past two decades two famous tools. One was the multidiameter cutter, a one body unit with alternate blades of varying dimensions, and the other was the balanced drive inverted counterbore, or back spotfacer which was the first standardized design for currently required sizes. Continuous improvements to meet increasing production in 1940 gave the company a head start on today's war needs. According to Eclipse officials one day's production now often runs higher than a month's total production of 1930.

• Addressing a war conference of the National Electrical Wholesalers Association at Buffalo, May 25, William L. Batt, vice-chairman of WPB, warned that the shifting needs of America's war machine would result in idle plants and unemployment in some areas and increased manpower shortages in others. "We cannot avoid the fact," he said, "that more plants have been built for some products than can be kept running steadily. Some of our plants have had to slow down; more will have to, and some will be shut down."



**"GLAD THE
ENGINEERS
ARE SPECIFYING
HARPER BOLTS**

"Harper Bolts don't rust. They're tough and they'll make this pump last a lot longer."

Yes . . . the non-ferrous and stainless fastenings made by Harper are adding extra toughness and extra service-life to vital parts of ships, tanks, jeeps, planes and other war equipment. Also in hundreds of war production jobs they are preventing failures of vital equipment and keeping production rolling. They have high tensile strength; they resist rust, corrosion, many acids and alkalis and other tough conditions.

4320 STOCK ITEMS . . . of bolts, nuts, screws, washers, rivets and accessories in the non-ferrous and stainless alloys.

WRITE FOR CATALOG . . . and reference book—80 pages—4 colors—193 illustrations—numerous tables and other data. Free when requested on a company letterhead.

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STRIP STEEL**

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ALLOY . . .**

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YOUR INQUIRIES ARE INVITED

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STEEL CORPORATION

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NEWS OF INDUSTRY

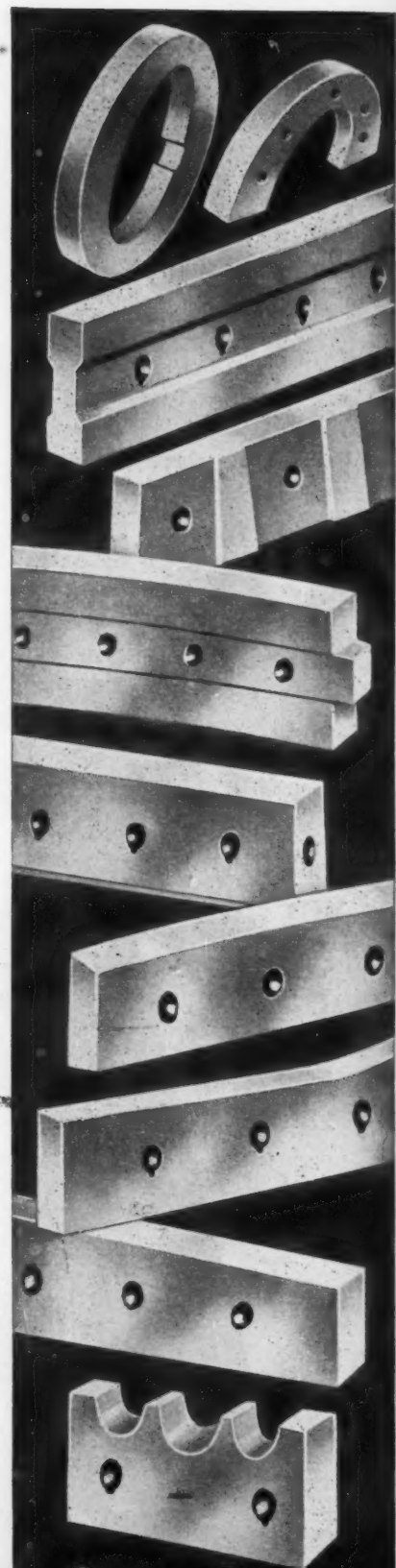
**Jams in Plane Parts
Held Minor but Serious**

• • • "There are at present no serious bottlenecks in the assembly of such fundamental plane parts as propellers, engines, or air-frames," Charles E. Wilson, executive vice-chairman of WPB said recently. "Temporary but serious minor bottlenecks, however, in smaller and less obvious categories, such as forgings and extrusions, have not been entirely overcome. The specific shortages differ from month to month, but will continue to arise until production and distribution of all plane parts and pieces are exactly balanced with requirements," Mr. Wilson said.

The most significant developments in the program to date are the increased emphasis on heavy bombers and the steady increase in the average weight of all combat types. The former development is dictated by the proved quality and effectiveness in various war theaters of the heavy bombers, and the latter development arises out of the addition of increased firepower, armor, bomb load, and overall performance. While April production was about twice that of April, 1942, total weight produced was almost three times greater. The average weight per plane currently is about 30 per cent greater than a year ago, and in 1944 this figure will rise to about 60 per cent, with demands for steel, aluminum, and other materials increasing proportionately.

Ten per cent of all planes produced in April, 1943, were four-engine bombers, as compared to less than 5 per cent in April, 1942. By April, 1944, production schedules call for production of bombers of the type now being built at a monthly rate eight times greater than in April, 1942, and this does not include the scheduled output of new super-bombers such as will be built in Cleveland and Atlanta.

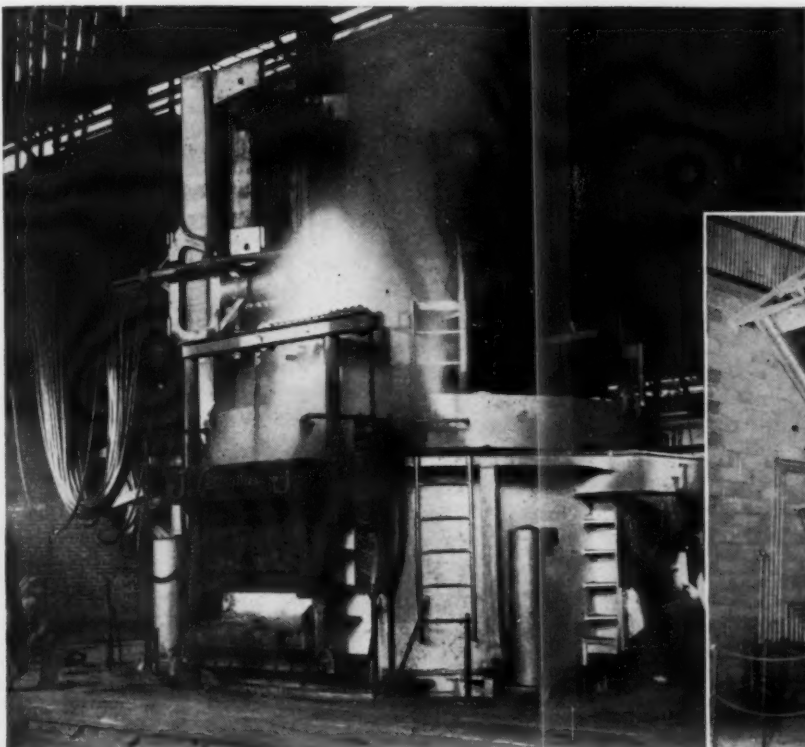
The schedule of fighting ship production this year is about three times the number of both fighters and bombers built in 1942, and the proportion of trainers, both in numbers and weight is declining. Of over 100 planes produced in April, 1942, 40 were trainers. In April, 1943, only 30 per cent were trainers, and by April, 1944, only 15 per cent will be trainers. Considered in terms of weight, from 14 per cent of 1942 production, trainers will drop to only 4 per cent in 1944 schedules.



**Greater Tonnage
Per Edge of Blade**



**AMERICAN
SHEAR KNIFE CO.
HOMESTEAD · PENNSYLVANIA**



A 75 ton, size "J" LECTROMELT furnace used on alloy steel production in a large eastern steel plant.



This size "OT" 10-ton LECTROMELT, shown in pouring position, has poured 15 tons in one heat.



FROM 100 TONS to 25 POUNDS CAPACITY

MOORE RAPID

Lectromelt
FURNACES

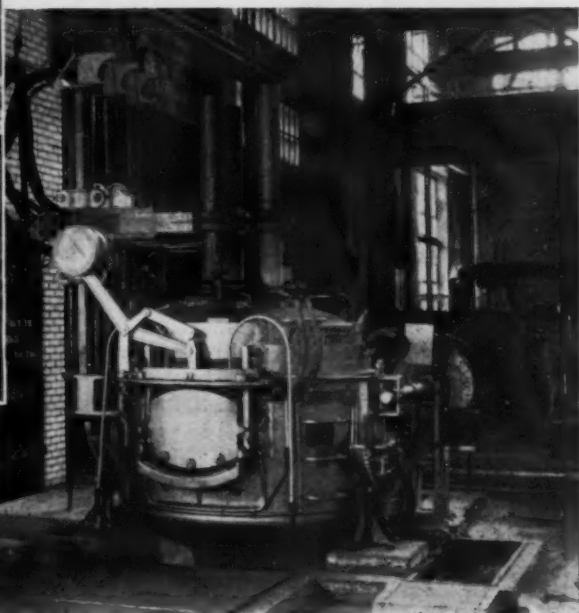
Pittsburgh Lectromelt Furnace Corporation
Pittsburgh, Penna.



Tapping a heat of plain carbon steel from a size "KT" LECTROMELT furnace—one of the largest top charge electric furnaces in the United States.



This "R" size unit is one of the most popular of the smaller capacity furnaces. It is used for two-ton heats.



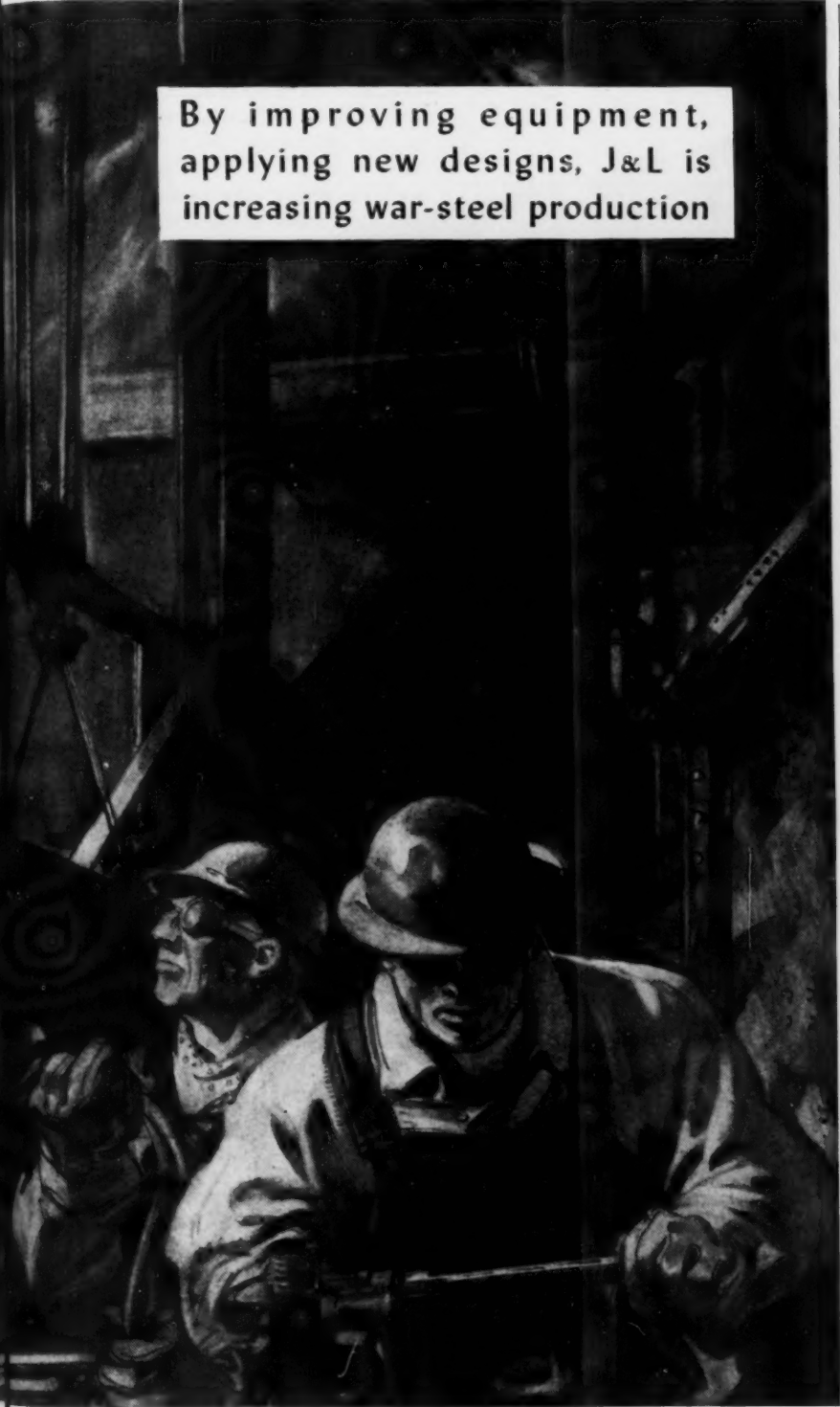


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On the steel front the forward lines of production are backed up by the design-engineers and draftsmen, the maintenance men and construction crews. Scores of special engineers, in cooperation with experienced steel men, design new furnaces and develop mill improvements for increasing steel production. They coordinate their plans with the on-rushing

future so that at the first opportunity, essential new work can be built with minimum interference to war-steel production. In the constant glare of adjacent furnaces, hundreds of riggers, welders, carpenters, bricklayers, pipe-fitters, electricians, men of a dozen crafts and trades, are working at a fighting pace building new steel-making facilities — rebuilding and



By improving equipment,
applying new designs, J&L is
increasing war-steel production

FROM AN ORIGINAL DRAWING BY ORISON MACPHERSON

ND WAR-STEEL PRODUCTION

improving others. Today, more steel than ever before — 85 million tons a year — is being produced to provide our fighting men with arms and equipment to crush enemy forces and to protect our own.

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MORE FIGHTING STEEL

Over billion dollars has been invested by steel industry since Hitler invaded Austria, to increase steel making capacity and to improve manufacturing equipment for production of more fighting steel. Uncle Sam is augmenting steel industry's further investments to obtain still greater capacity.

3 hours equivalent to one year is the true equation when comparing the tonnage of steel produced in three hours in U. S. A. today with the entire tonnage of iron produced in the thirteen American colonies during the year 1775. Colonial production stood at 30,000 tons annually, U. S. today has annual productive capacity of over 85,000,000 tons of steel, accounting for half the world's estimated production.

"First iron-clad boat in world" according to a resolution in Pennsylvania legislature introduced by Representative D. W. Dalrymple (R, Erie) may go to war again. Century-old lake revenue cutter constructed at Pittsburgh in 1843, at cost of \$125,000, assembled and launched at Lake Erie and now resting on lake bottom, may be salvaged for scrap for the war steel industry. First commissioned the "Michigan," later named the "Wolverine," the granddaddy of modern battleships, for years on exhibition at Erie, Pa., has been allowed to sink in the mud until now called to go forth to serve her country again.

A pelican hook isn't what you may think it is: to a sailor it's just a type of quick releasing hook used where fast work is necessary.

"Weatherizing" war planes while on the assembly line, and making other equipment changes proved by combat experience to be required for the varying conditions of our theatres of war, without halting the flow of fighting ships, is a difficult Yankee achievement that may be the margin-of-victory factor in the air. Today U. S. fighters and bombers are rolling off the lines equipped to meet the icy gales of Alaska, to withstand the hot North African deserts, the excessive humidity of equatorial jungles. For lack of such a plan, U. S. aircraft men say, the Luftwaffe was defeated by cold weather on the Russian front in the 1941-42 winter.

Moving day by air is a post-war development many will be interested in if application is granted to a transfer company in Pittsburgh by the CAA to establish "an air hauling service to any place in the United States and Alaska." A part of the plan is to "serve 33 cities in Pennsylvania with air transportation of household goods, office furniture, machines and other equipment." The company proposes to start with two 5-ton cargo planes, to add two 10-ton ships and even gliders to carry a ton or two each and be cut off the air train to land at local airport.

Use of Rolled Zinc and Zinc Alloy

(CONCLUDED FROM PAGE 57)

scribed, drawn parts can also be satisfactorily produced from these sheets. They have given very good results, particularly for larger articles for which the rather higher tolerances for thickness do not matter much as, in the manufacture of large cans and also of drawn vessels (up to a height of 35 ft. and 4.5 ft. diam-

eter), for which it is advisable to work with a rather narrower die clearance. Today, there can still be found cases where zinc alloy sheets and strip are used for many purposes where straight zinc would be equally suitable. This is due chiefly to ignorance of the various straight zinc rolled products available and also to

exaggerated propaganda in favor of zinc alloys. With the present position of raw materials, the use of zinc alloys, which contain very costly metals, such as copper, manganese, antimony and aluminum, besides highest purity zinc as basis metal, can only be permitted when absolutely necessary. To withstand high mechanical strains and temperature action, the higher zinc alloys, such as Zn-Al 4-Cu1 and Zn-Al10-Cu1 are particularly suitable. They are, however, of lower ductility, so that they have to be used mainly for stamped parts.

Phosphate and Oxide

(CONCLUDED FROM PAGE 62)

the solution itself is a good cleaner. Also, complete rinsing after processing is not mandatory as the film remaining inhibits corrosion on steel. However, the solution is hard on hands and clothes, and parts should be completely rinsed so as to preclude possibility of harmful effects on materials with which they may come in contact.

The film formed is an iron oxide. It penetrates the metal surface only 0.00001 in. or so and causes no dimensional buildup on parts. Thus no difficulties would be encountered with the use of this finish on threads and finely machined surfaces. The shiny blue-black film is also ornamental. A high luster may be obtained if parts are polished prior to processing. All surface imperfections, machining marks, and scratches, will not only show in the finish, however, but will seemingly be magnified. Parts must be polished or buffed prior to processing if perfect surface finish is expected. A sandblasted surface will give a dull, black coating.

Certain manufacturers of proprietary compounds for the oxide process advertise that the oiled coatings obtained by their process have good lubricating, or friction reducing properties. They also claim greater abrasion resistance on processed parts.

The main disadvantage of the oxide process lies in the poor corrosion resistance of the finished parts. When tested in a standard salt spray conforming to specification AN-QQ-S-91, bare panels last only 2 to 5 hr. Even oiled panels ordinarily show signs of rusting in less than 20 hr. Obviously, structural parts for aircraft processed in this manner could not be expected to stand up under severe service conditions.

MEAKER
EQUIPMENT

for

PLATING
CLEANING
PICKLING
GALVANIZING
(electro-process)

MEAKER
PROCESS
for
Electro-Galvanizing
Wire

ECONOMIZES ON ZINC
Produces Uniform Thickness
At All Points

When you buy equipment for plating, buy with an eye on quick conversion to peacetime decorative plating with nickel, chrome, copper, brass, etc. Meaker equipment can be changed over to the peacetime job in a jiffy. Fact, many of our customers right now are getting new equipment to hustle that war job, and hustle that peace job, too, as soon as we have finished the Axis.

The Nation's Leading Practical Plating Engineers

The MEAKER Co.

1635 SOUTH 55TH AVENUE, CHICAGO



PARISH STAMPINGS

The railroads of the country have proved themselves miracle workers in the transport of war goods. An equally remarkable accomplishment is heralded for the post-war economy.

Soon to be on the drafting board are designs for rolling stock that will make possible transportation of passengers and freight at the lowest per mile cost ever known.

Steel, as always, will be the basic element in this further advance; for steel, properly alloyed, or properly surface protected, provides resistance to the elements beyond that accomplished by any other material.

Steel also provides resistance to fatigue, to shock, to temperature changes, that is bound to make it the reliance of the future just as it has been of the recent past.

Pressed Metal Parts and stampings will be used by the railroads, and by numerous other industries of the country because of their low cost, their broad range physical characteristics, their aid in the creation of beauty, and for their other well known qualities that has called for the tonnage in the past.

Parish Pressed Steel engineers will be found cooperative and helpful. Why not call on us while your plans are in the preliminary stage.

★
METAL
STAMPINGS

★
MODERN
DESIGN
AT LOW COST



PARISH PRESSED STEEL CO., Reading, Pa.
Subsidiary of SPICER MFG. CORP.

Western Representative F. Somers Peterson, 57 California St., San Francisco, Cal.



New Yorker First In Lincoln Awards

Cleveland

• • • Herman J. Brenneke of New York University, New York, was the first prize winner in the Engineering Undergraduate Award and Scholarship Program of the James F. Lincoln Arc Welding Foundation. The prize amounted to \$1,000, and an additional four scholarships of \$250 each

were presented in his name to his university's department of mechanical engineering. The winning paper was titled, "Arc Welding Versus Casting in the Design of Jigs and Fixtures." The paper showed his own redesign of a jig for welded construction and a description of the benefits of welding which indicated a saving in

cost of \$45.18 and a saving in time of 17 hr.

The second cash award went to Robert Edson Lee of Iowa State College, Ames, Iowa, for his paper "An Arc Welded Chair." He received \$500 and two scholarships of \$250 each were presented in his name to his university's department of architectural engineering. Charles L. Sammons and John H. Stewart of Ohio State University, Columbus, jointly received the Foundation's third cash award of \$250 and a \$250 scholarship was presented in their names to their university's department of civil engineering. Their paper dealt with the application of arc welding to the design and construction of a radio tower.

In all, 77 awards totaling \$5,000 were made by the Foundation to students representing 33 colleges and universities, and the seven scholarships won by students amounted to \$1,750.

Canadian Agencies Included Under Provisions of Reg. 5A

Washington

• • • Authorized governmental agencies and institutions in Canada are eligible for use of the provisions of CMP Regulation No. 5A, covering maintenance, repair and operating supplies, WPB has announced. This action was taken by amendment of the regulation covering governmental and institutional MRO users, and is similar to a provision for Canadian industries which has been included in CMP Regulation No. 5 covering general MRO procedures.



They'll Out-Blitz 'em

Rat-tat-tat . . . and down goes another enemy plane! Our pilots and bombardiers have what it takes to out-blitz them.

It's our job back home to *out-build* the enemy. We're now doing it. Keep it up, America—work hard, avoid waste, buy more War Bonds!

THE GARLOCK PACKING CO., PALMYRA, NEW YORK
In Canada: The Garlock Packing Co. of Canada, Ltd., Montreal, Que.



GARLOCK

Electric Arc Welding Solves Dinner Problem

• • • Electric arc welding again proved its worth by coming to the aid of R. G. LeTourneau, Inc., when planning for the dedication ceremonies of its new Vicksburg, Miss., plant. The problem was to feed 6000 hungry guests a hot meal, and they were fed within an hour.

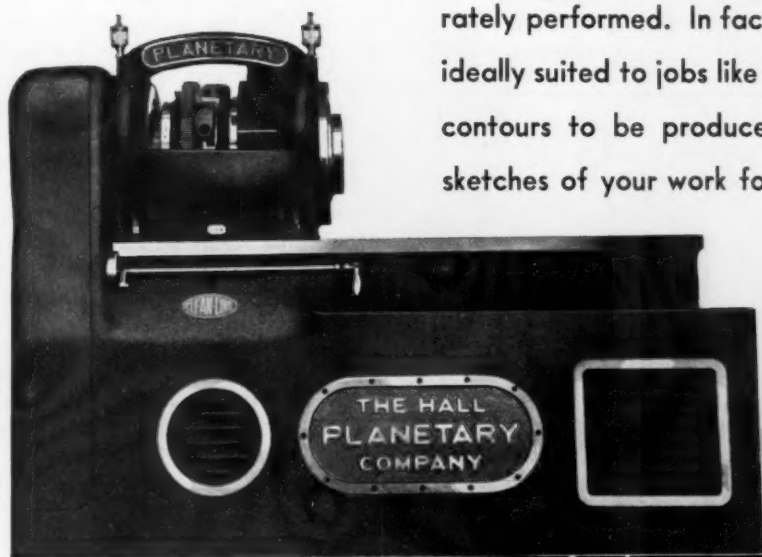
Five 350-gal. pots were designed and fabricated by arc welding and a pair of dollies was provided for each pot. When ready for serving, down the aisles rolled dollies with the dinner to the audience seated in the improvised auditorium.

Hobart Brothers Co., Troy, Ohio, considered this item a winner in its arc welding news contest.

THE PLANETARY

Speeds Aircraft Contour Milling Jobs

Six minutes for each end of an aircraft propeller spider completes the milling of the tapered contour as illustrated. The milling is accurately performed. In fact, the Planetary has a unique milling action ideally suited to jobs like this—enabling intricate internal or external contours to be produced in one fast, efficient operation. Send sketches of your work for suggestions on milling and threading the Planetary way.



The drawing shows the set-ups for milling both ends of aircraft propeller spiders. Cutters "A," shown above one center line, are used on one end of the spider and Cutters "B" are used to mill the opposite end. Heavy line indicates the surfaces that are machined.



HALL PLANETARY COMPANY

Fox Street and Abbotsford Road, Philadelphia, Pa.

Industry Urged Not to Abuse MRO Order

New York

• • • Continuance of MRO procedures for the purchase of maintenance, repair and operating supplies under CMP Regulation No. 5, as amended May 14, will be possible only if industry does not abuse the privileges granted by this regulation, William E. Arnstein, CMP division, WPB, New York, warned at the CMP forum held in conjunction with the annual convention of the National Assn. of Purchasing Agents last week.

Stressing that the quantity limitations in CMP Regulation No. 5 should be regarded as "maximum rather than as the best quantity to purchase," Mr. Arnstein stated that "abuse of the privileges in Regulation No. 5, though legal, may and probably will result in a request from the conscientious manufacturers that

the government protect them by revising the regulation in terms of added reporting features, controls and restrictions."

"CMP Regulation No. 5 is the most generous of the priorities regulations," Mr. Arnstein said.

"The reason why it was determined to permit purchase of MRO supplies without applications, authorizations and reports was, in my opinion, a good one. The government had long since adopted the policy of authorizing any reasonable request for operating supplies and the feeling was that as long as authorization was almost automatic, why force a manufacturer to go through a certain amount of red tape and a considerable delay for such materials, when no materials would be saved thereby.

"There can be little criticism of the logic behind this thinking. However, the successful operation will depend to a large extent on whether or not manufacturers as a group will refrain from buying those things which some inner voice tells them do not come within the term reasonable."

Illinois-Wisconsin A.F.A. Chapter Chooses Officers

Rockford, Ill.

Roy D. Baysinger, Geo. D. Roper Corp., Rockford, has been elected chairman of the Northern Illinois and Southern Wisconsin chapter of the American Foundrymen's Association. Other officers chosen at a recent meeting of the chapter include: vice-chairman, R. W. Mattison, Mattison Machine Works, Rockford; secretary, B. L. Baptist, Beloit Iron Works, Beloit, Wis.; treasurer, G. J. Landstrom, Sundstrand Machine Tool Co., Chicago.

New directors of the chapter are M. Reuteler, Fairbanks-Morse Co., F. N. Rundquist, Beloit Castings Co., Beloit, Wis.; H. Miner, Fairbanks Morse Co., Chicago; and J. R. Cochran, Sundstrand Machine Tool Co.

COMING EVENTS

June 2 to 3—SAE Diesel Engines and Fuels and Lubricants meeting, Cleveland.

June 7 to 9—American Electroplaters' Society annual convention, Buffalo.

June 9 to 10—SAE War Materiel meeting, Detroit.

Oct. 13 to 16—The Electrochemical Society, Inc., New York.

FOUNDRY

Spencer Turbo-Compressors for Foundry Service

GAS TIGHT ACID RESISTANT TURBO-COMPRESSORS

SPENCER B L A S T G A T E S

SPENCER TURBO-COMPRESSORS

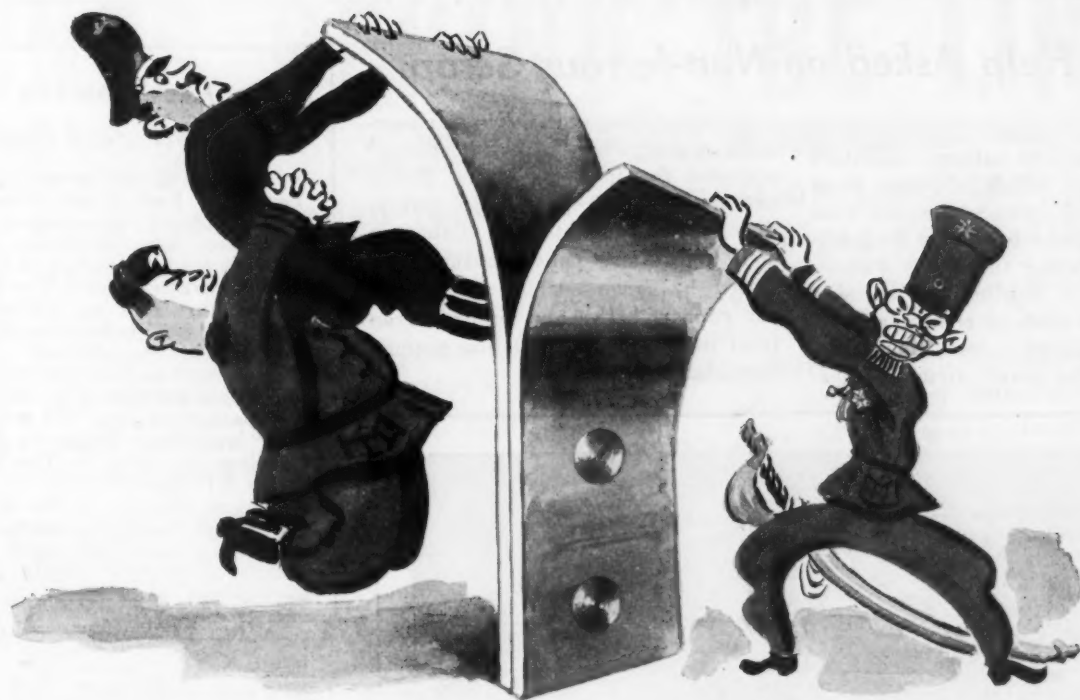
TURBO-COMPRESSOR DATA BOOK No. 107

SPENCER FOUR-BEAR TURBO-COMPRESSORS

SPENCER HARTFORD

TURBO-COMPRESSOR BULLETINS

THE SPENCER TURBINE COMPANY • HARTFORD, CONNECTICUT



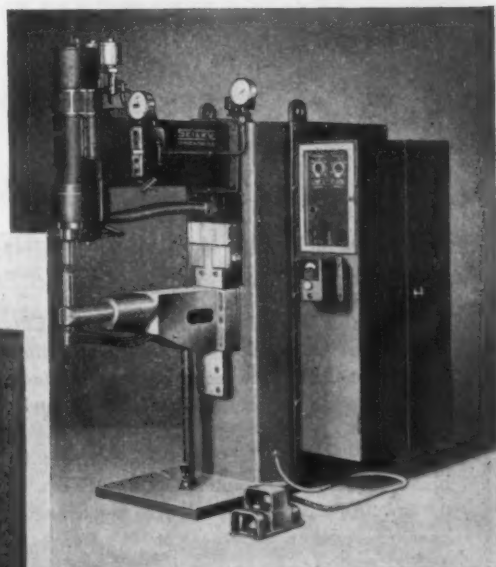
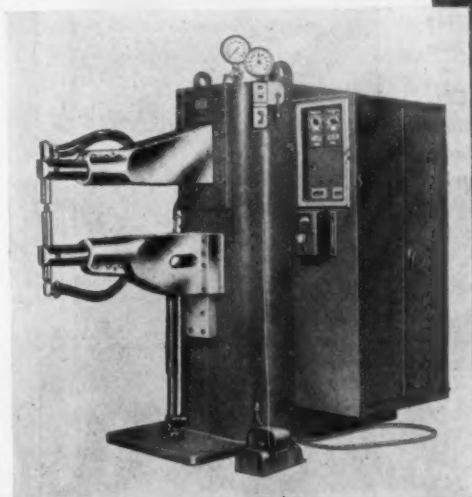
THE AXIS CAN'T TEAR US APART!

The Sciaky Process is helping fabricate our mighty flow of war materials with **STRONG, SOUND, UNIFORM WELDS!**

Adolph, Hirohito and Benito are beginning to feel the sting of our growing air power. However, America's program of 100,000 military aircraft in 1943 calls for faster production methods, stronger structures and fewer rejects.

The Sciaky Process of Electric Resistance Welding is helping to meet these needs with a superior method of spot welding aluminum and its alloys. Utilizing **STORED ENERGY, VARIABLE PRESSURE** and **PRE-HEATING**, these exclusive Sciaky features make possible the fabrication of sturdy, primary and secondary stressed assemblies at high speed.

SCIACY TYPE PMCR. 2516 ELECTRIC RESISTANCE ROCKER ARM WELDER, welding 70 spots per minute, on two sheets of aluminum alloy of .040" each. Welding capacity from two thicknesses of .016" in aluminum alloys up to and including .080".



TYPE PMCO. 2516 SCIACY ELECTRIC RESISTANCE WELDER. Eighty spot welds per minute on two sheets of light alloy of .040" each. Welding capacity — from two thicknesses of .016" each in light alloys up to .091".

SCIACY BROS.

Manufacturers of a Complete Line of
A.C. and D.C. Electric Resistance Welding Machines.
4915 WEST 67th STREET • CHICAGO, ILLINOIS

Dealer Help Asked on Non-ferrous Scrap

Washington

• • • Scrap and salvage operators with facilities to do so have been asked by WPB Salvage Director Paul C. Cabot to assume greater responsibility in assisting the Scrap Processors Branch in locating and expediting the movement of critical copper, brass and bronze scrap from trade sources holding small accumulations.

Branch representatives are endeavoring to assure the 60-day "turn-over" provided for in WPB Order M-9-b, which relates to copper scrap. Nevertheless, according to Mr. Cabot, a more aggressive policy must be assumed by large dealers in flushing out copper, brass and bronze scrap from its dormant status into production channels.

Have You Seen the New CMP Fact Finder?

• • • It's in this issue . . . the new CMP Fact Finder developed exclusively for readers of THE IRON AGE. Realizing that abbreviated information on CMP is not always enough, the Fact Finder furnishes an alphabetically indexed guide to the official text of CMP regulations.

No longer do you need to scan the whole regulation to find the one paragraph that will answer your question. Refer to your problem, by topic, in THE IRON AGE CMP Fact Finder. It will give you the clue to the exact paragraph in official texts and in many cases to the IRON AGE article which will clarify your query. See page 99.

Tool Steel Advisory Group Invited by OPA

Washington

• • • Eight high executives in the nation's tool steel industry were invited by Price Administrator Prentiss M. Brown on Monday to become members of a Tool Steel Advisory Committee which is being formed to confer with OPA on tool steel pricing matters. The committee will be the sixth Industry Advisory Committee to be formed by the Administrator to serve as liaison between OPA and steel makers.

The eight invited to serve as tool steel advisers are:

Russel M. Allen, general manager of sales, Allegheny Ludlum Steel Corp., Brackenridge, Pa.; T. H. McGraw, Jr., pres., Braeburn Alloy Steel Corp., Braeburn, Pa.; J. H. Parker, pres., Carpenter Steel Co., Reading, Pa.; A. T. Galbraith, vice-pres. in charge of sales, Crucible Steel Co. of America, New York; L. Gerald Firth, pres., Firth-Sterling Steel Co., McKeesport, Pa.; M. W. Saxman, Jr., pres., Latrobe Electric Steel Co., Latrobe, Pa.; J. O. Rinek, vice-pres., Universal-Cyclops Steel Corp., Bridgeville, Pa.; Floyd Rose, vice-pres., Vanadium-Alloys Steel Co., Pittsburgh.

Advisory Group Named For Sheet Warehouses

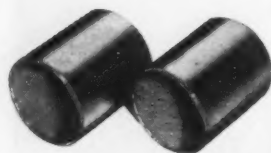
• • • The Director of Industry Advisory Committees, WPB, has announced the formation of the following industry advisory committees during the past week:

Warehouse Industry Committee

Fred S. Doran, Joseph T. Ryerson & Son, Inc., Chicago; J. D. Finnegan, Hynes Steel Products Co., Youngstown, O.; W. H. Franklin, Edgecomb Steel Co., Philadelphia; Sol Friedman, Reliance Steel Corp., Cleveland; Maxwell Jospes, Production Steel Co., Detroit; Newton F. Korhumel, Lapham-Hickey Co., Chicago; Donald C. Lott, Tin Mill Products Corp., Pittsburgh; M. R. Lowenstine, Central Steel and Wire Co., Chicago; W. E. Thorsen, Great Western Steel Co., Chicago.



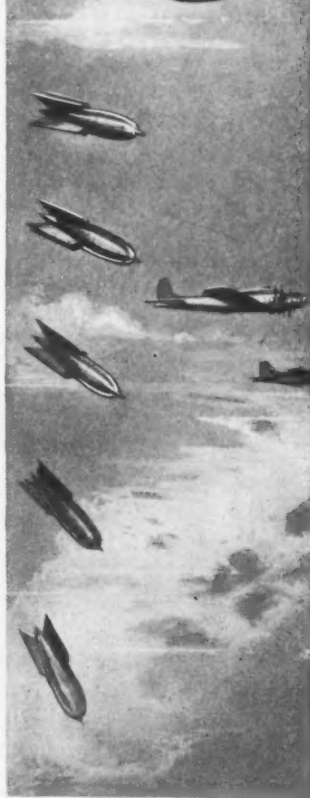
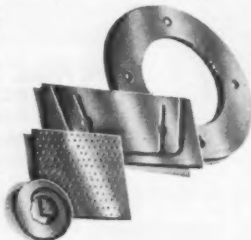
Speeding Destruction



The business of dropping a package of "eggs" on Tojo is easier and more efficient because of sleeve

type bearings. The interesting feature of this application is that it employs a bearing material as new as the war.

Johnson Pre-Cast Bearing BRONZE-ON-STEEL was developed to meet peace time applications, but, like many another product, it was easily converted to armament needs. When peace returns, manufacturers will find that Johnson BRONZE-ON-STEEL . . . combining the bearing qualities of BRONZE with the strength of STEEL . . . will give them greater bearing performance in their product. It will be available as finished bearings or in strip form for stampings. It is an ideal metal for washers or other flat pieces. Write for complete information.



Write for NEW LITERATURE

JOHNSON

SLEEVE BEARING

505 S. MILL STREET



BRONZE

HEADQUARTERS

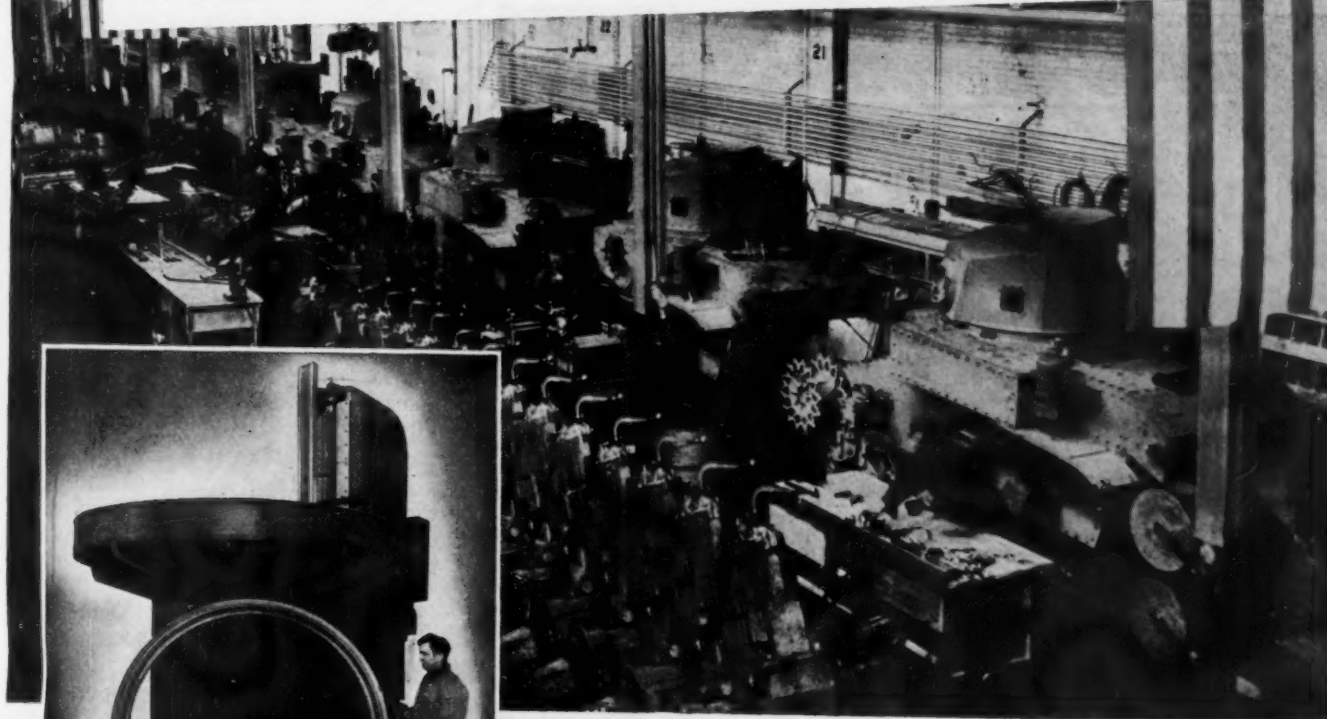
NEW CASTLE, PA.

LINES BEHIND THE LINES

FROM THE RAILROAD INDUSTRY'S PRODUCTION LINES COMES A VARIETY OF "ROLLING STOCK" TO BACK UP THE FIRING LINES

Intensifying production of vitally needed transportation equipment is just one of the railroad industry's war assignments. To it has been intrusted the added task of producing many other

types of war matériel. Where seconds count and precision is at a premium, the railroad industry relies on broaching—a better way to do many metal working jobs, the only *right* way to do some!



This big tank turret gear, taller than a six-foot man, is economically and automatically broached on an *American* surface broaching machine. No special skill is needed. One operator, one machine, and tooling by *American*—equal a precision job at a production rate!

Three internal teeth are cut and finished with each pass of the tool. At completion of the stroke the broach is hydraulically withdrawn from the cut, and the gear is indexed to next working position during the upward stroke. When the 348 teeth are finished the machine automatically stops, permitting easy and rapid reloading of a new blank.



BROACHING IS BETTER
THE *American* WAY

American

BROACH AND
MACHINE CO.

ANN ARBOR, MICHIGAN

BROACHING MACHINES
PRESSES
BROACHING TOOLS
SPECIAL MACHINERY

DIVISION OF

WPB Issues Three New Allotment Forms for Use by CMP Consumers

Washington

• • • Suggested forms of use by contractors (consumers of controlled materials) in extending allotments of controlled materials to their sub-contractors (secondary consumers) were issued last week by the CMP Division

of WPB. At the same time, forms for use by manufacturers in increasing or decreasing allotments of controlled material to their sub-contractors have been issued.

Form CMPL-150A, may be used by all contractors making allotments to

sub-contractors producing Class A products except in the case of allotments being made under programs of the Aircraft Resources Control Office (Aircraft Scheduling Unit). The form shows the authorized production schedule and the allotment of controlled materials to the sub-contractors, together with the allotment number. It also shows the preference rating assigned for use in obtaining non-controlled materials to complete an authorized production schedule. Copies of this form will be available at WPB field offices. However, the form may be reproduced by manufacturers desiring to use it in large quantities.

Forms CMPL-200A and 201A provide the instrument with which contractors may increase or decrease allotments to their sub-contractors. Form CMPL-200 and 201, issued at the same time are for use by claimant agencies and industry divisions in increasing or decreasing allotments. The four forms concerned with adjustments in allotments also provide a means for indicating revisions in authorized production schedules. The instructions for use of these forms make it clear that production schedules authorized through their use supersede all previous authorized production schedules for the products involved.



• If one of your problems is springs — dependable springs, that you must have in reliable quantities to keep your production at its peak—perhaps we can help you.

With our organization running in smoother-than-ever form we are producing more and faster and better products—to help you produce more, faster and better. We've learned short cuts and

through experience have accumulated "know how" that is saving much time, trouble and headaches.

That is why we feel that your seemingly tough spring problem may find an easy answer here at Accurate. If you will show us what type—how many—and when you need springs or wireforms, we'll come up with answers you may find pleasantly surprising.

Send for the new Accurate "Handbook of Technical Data". It's handy, compact, informative. You'll be glad to have it.

ACCURATE SPRING MFG. CO., 3819 W. Lake St., Chicago, Ill.

Priority Changes

L-30-a—Amended order revises manufacturers' quotas for the current quarter to permit increased production of garbage and ash cans. (5-25-43)

L-272—Schedules IV and V, simplifying gages and regulators, respectively, are added to the order to raise production of these items 15 to 25 per cent.

L-291—Order limits the use of wire stitching or stapling for the commercial binding of certain printed matter, such as magazines, periodicals, pamphlets, calendars and blank paper. (5-25-43)

L-296—Order provides a plan for the establishment of warehouses to handle aircraft hardware and components to be available in limited quantities for the aircraft industry. (5-24-43)

M-38—Order as amended makes lead more readily available as a substitute for more critical materials going into essential production. The order formally revokes Order M-38, 38-a, 38-b, 38-d to i, and supersedes M-38-c. (5-26-43)

M-43—Amended order effects technical changes aimed at correcting certain inequities in the conservation of the nation's supply of tin. (5-25-43)

M-183—Amended order further defines the restriction on phosphate plasticizers and outlines the method of filing allocation appeals. (5-24-43)

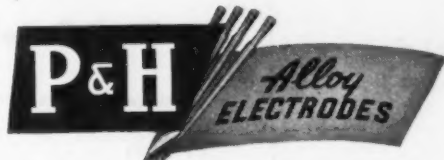
I'll Guard the home front

—against the forces
of **GENERAL WEAR**

"HARCOTE" is ready! Ready to protect softer steels against the ravages of wear—to help you keep machinery on the job—now—when replacement parts are so difficult to obtain.

P&H "Harcote" is a hard surfacing electrode—both hard and tough! It's ideal for refacing parts subject to severe wear and abrasion, such as shovel teeth, scraper blades, farm implements, sand and rock handling equipment, and many other applications on carbon steel, low alloy and high manganese surfaces. "Harcote" is just one of the family of P&H Alloy Electrodes which answer every welding need. P&H representatives will gladly assist you. Or write us for literature and procedures.

Ask also for information about P&H Arc Welding Machines.



A new star has been added to P&H's award for excellence in war production.

General Offices: 4401 W. National Avenue, Milwaukee, Wisconsin



Canadian Distribution: The Canadian Fairbanks-Morse Company, Ltd.



OPA Sets Price Rule for New Products

Washington

• • • Manufacturers were authorized by OPA last week to set their own prices under the General Maximum Price Regulation for new products not sold by them or by competitors during March, 1942, instead of asking the national OPA office to set the price as has been required in the past.

Self-determined prices, arrived at

by use of a simple formula, are to be reported to the nearest OPA field office within 10 days of their determination and are the sellers maximum prices. Provision has also been made for manufacturers to apply for a price at a field office instead of the national office where the formula cannot be applied.

Adjustments in any price so deter-

mined may be ordered by OPA. The OPA action does not apply to products covered under other regulations or to products for which a pricing method has already been fixed by OPA by orders under section 3 (b) of General Maximum Price Regulation.

These changes in the methods of pricing new products, contained in Amendment No. 54, effective May 29, to the General Maximum Price Regulation, are in line with OPA's policy of simplifying procedure.

Wyandotte

METAL CLEANING AND DEGREASING COMPOUNDS

*are saving time and money
on a wide variety of production jobs*

With storage stocks located in 214 cities (from coast to coast, and Canada to the Gulf) Wyandotte Field Representatives are better able to help speedily with such jobs as—

Cleaning brass and steel cases, all sizes, after drawing and machining.

Cleaning H. E. and A. P. projectiles, all sizes, after machining, and prior to lacquering and painting.

Process cleaning of airplane motor parts (aluminum and magnesium).

Cleaning sheet aluminum prior to spot welding and for cleaning sheet and cast aluminum prior to anodizing.

Cleaning bombs prior to painting and lacquering.

Cleaning prior to cadmium zinc or hard chrome plating.

Cleaning prior to all blackening and bluing operations and after Magnaflux.

Cleaning prior to Bonderizing and Parco-Lubrizing operations.

Use in water wash spray booths.

Burnishing and stripping.

There is a Wyandotte Specialized Cleaner for every Metal cleaning problem and for use in all types of equipment.



Service Representatives in 88 Cities

WYANDOTTE CHEMICALS CORPORATION

J. B. FORD DIVISION

WYANDOTTE, MICHIGAN

Wyandotte Chemicals Corporation consolidates the resources and facilities of Michigan Alkali Company and The J. B. Ford Company to better serve the nation's war and post-war needs.

Brass and Wire Mills Allowed to Accept Orders For Other Mills

Washington

• • • A brass or wire mill may accept an authorized controlled material order for a brass mill product which it does not produce, but only if it first can arrange to have the required item produced by another mill, under Supplementary Direction 9 to CMP Regulation No. 1, WPB has announced. In such cases, the allotment number or symbol appearing on its customer's authorized controlled material order may be extended by the brass or wire mill to the order which it places with another mill.

Under established CMP procedure, extension of customers' allotments or rating by controlled materials producers is not permissible. The direction provides an exemption from the general rule under the conditions specified. The direction expressly provides, however, that the material may not be used in any way by the brass or wire mill which places the order and is not to be included in reports to WPB as an order which it received or filled. The mill which actually produced the material reports acceptance and shipment.

CMP Developments

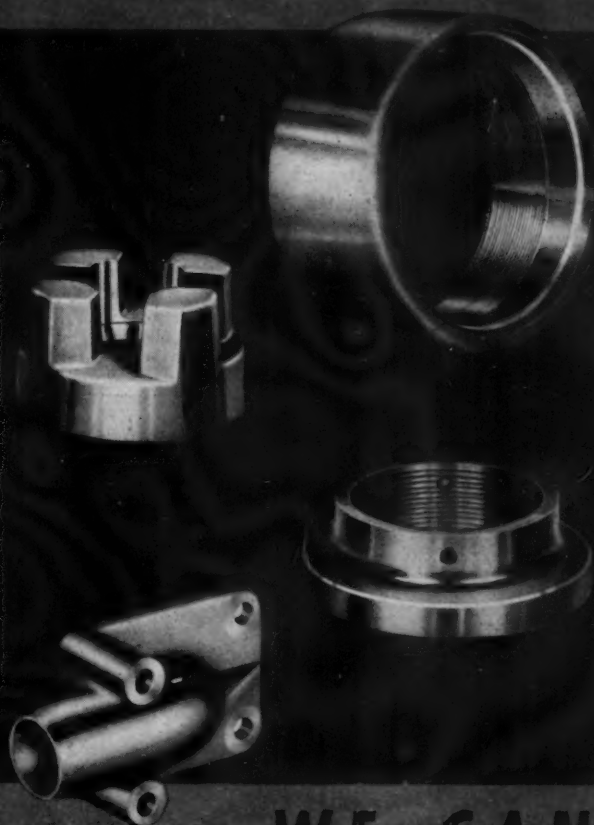
• Controlled materials needed by the producers of radio and radar are curtailed despite essentiality of the products made. (CMPL-150)

• Food processors have been added to the list of manufacturers who will be permitted to obtain MRO supplies under Reg. 5.

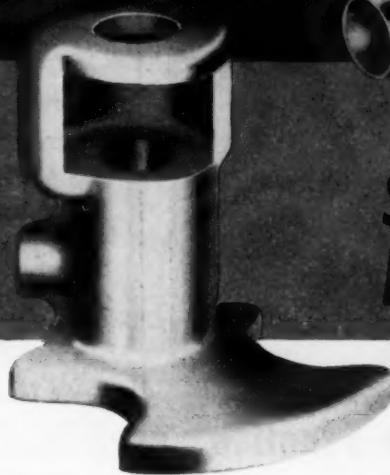
• Supp. Brass Mill Warehouse Direction 1-a to Reg. 4 lifts the weight limitations placed on deliveries of copper to warehouses in the case of condenser tubes.

• Direction 2 to Reg. 5 provides that shoe wire may be obtained under the uniform procedure which the regulation provides for obtaining maintenance, repair and operating supplies of controlled materials. (Release No. WPB-3650)

**WE HAVE
EXTRA FOUNDRY
CAPACITY FOR
BRASS OR
BRONZE CASTINGS**



**WE CAN
SUPPLY THEM
IN A HURRY!**



● At the present time we have ample capacity and equipment for the manufacture of brass or other copper base alloy sand castings.

In addition to the most modern equipment we have experienced men who have been in our foundry for years. These men have the "know how" for the production of close tolerance work. The castings produced are of uniformly high quality with close grain structure.

We have our own Tool Room and Pattern Shop for any necessary tools or patterns to turn out the job. We can supply them rough, machined, polished or plated.

We manufacture the standard line of STREAMLINE pipe fittings for heating, air conditioning, water works, plumbing or refrigeration use, or to your specifications.

If you need castings in a hurry, write us now.

**MUELLER
BRASS CO.
PORT HURON, MICH.**

Clauss Placed at Head Of Steel Expansion

Washington

• • • Julius A. Clauss, special assistant to Steel Director H. G. Batcheller, has been assigned to head WPB Steel Division's Plant Facilities Branch, the section which is supervising the steel expansion program. This with other organizational changes have been made in the Steel Division, along with the appointment of John T. Whiting,

president of the Alan Wood Steel Co., as deputy director of the Steel Division. Mr. Whiting's appointment was announced in THE IRON AGE of May 27. Harry Bryant, Chief of the Steel Construction Division has been appointed assistant to Mr. Clauss and G. H. Beaumont has taken Mr. Bryant's former post. P. M. Reinartz, Chief of the Planning Section of the

Plant Facilities Branch has resigned to return to the American Rolling Mill Co., Middletown, Ohio.

Mr. Clauss, Chief engineer for the Great Lakes Steel Corp., will expedite the expansion of ingot capacity to more than 97,000,000 tons a year.

Directives Ruled Out Of Reg. 8 in Some Cases

Washington

• • • CMP Regulation No. 8, covering production requirements of controlled materials producers, has been amended to indicate that in some instances, where a controlled material producer requires the same basic material as that which he produces to fabricate another form of controlled material, such material may be made available through the allotment procedure rather than by directive. The action is taken by Amendment 1 to CMP Regulation No. 8 which deletes sub-paragraph (4) of paragraph (c) of the regulation.

Extra Loading Cost May Be Passed On for Chrome Ores

• • • When a buyer of metallurgical-chemical chrome ore asks that a shipment of ore be made by box car rather than gondola car the seller may so ship and pass on the additional hand loading expense to the buyer, the OPA announced last Friday.

Amendment No. 2 to MPR No. 258 permits the ore seller to increase his maximum price by an amount equal to the extra expense entailed in loading. The amendment becomes effective June 2.

Price Briefs

• Amendment No. 13 to MPR 188 defines further certain builders' materials.

• Amendment 177 to Supplementary Regulation 14 provides relief for charcoal producers who have been caught with rising labor and raw material costs.

• Amendment 87 to Regulation 136 makes two corrections affecting the depreciation rates used in computing maximum prices for second-hand machines and parts. Effective date is June 2. (Release No. OPA-T-930.)

• Amendment No. 1 to MPR No. 380 provides that all sellers of used metal coil and flat bedsprings will be licensed automatically to sell these bedsprings after May 26. (Release No. OPA-T-959.)

• Amendment No. 88 to MPR 136 provides that sellers of second hand machinery are permitted to add actual transportation charges from Seattle to the job sites in sales to Alaskan buyers. (OPA-T-937.)

Censor...



Checking the grain size of steels in the Fairfield Metallurgical Laboratory.

... of Production Practice

FROM start to finish Fairfield gears are subjected to exhaustive tests and examination. They are made on the finest equipment available, heat treated under extremely close control, painstakingly inspected, tested on gear laboratory equipment and built to meet the highest standards.

Typical of Fairfield's extensive facilities is the metallurgical laboratory shown above. Here is the censor of production practice—gear materials and finished gears must live up to this department's requirements.

Fairfield customers, among the leading manufacturers of civilian and war machines, know that they can rely on Fairfield gears to match their own standards of quality production.

GEARS Made to Order

SPIRAL BEVEL
STRAIGHT BEVEL
HYPOID

SPUR
HELICAL

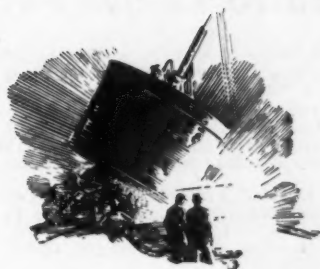
HERRINGBONE

WORMS AND WORM GEARS
DIFFERENTIALS



FAIRFIELD MANUFACTURING COMPANY
305 S. Earl Avenue • Lafayette, Indiana

for FINE GEARS



STAINLESS STEEL

STAINLESS steel is playing an important role in Allied war production. Our aircraft, warships and motorized units utilize this strategic material. Production of chemicals, explosives and synthetic rubber is facilitated by use of stainless steel equipment. In many other fields, where high tensile strength and resistance to heat or corrosion are demanded, stainless steel is specified.

As America's largest and only exclusive producer of stainless steel, Rustless is filling a substantial portion of these wartime needs. Rustless is doing more. Through use of its unique process, Rustless is conserving America's limited resources of chromium and electrolytic nickel. This is important, because the stainless steel industry is the largest consumer of low-carbon ferrochrome and electrolytic nickel, both of which are among the most critical of strategic materials.

The Rustless Process is based on the use of sub-grade chrome ore and stainless steel scrap, of which there are adequate supplies in this country. More than 65% of the nickel used by Rustless is obtained from scrap, while only 3% of its chromium comes from low-carbon ferrochrome. Thus Rustless is not only meeting wartime demands, but through its conservation efforts is also assisting greatly in meeting the critical supply problem of these two metals.

These advantages of the Rustless Process will be of equal benefit in meeting a greatly expanded use of stainless steel after the war. When that time comes, Rustless will be ready with a fund of new technical knowledge and specialized experience to devote to the problems of peace.

RUSTLESS IRON AND STEEL CORPORATION, BALTIMORE, MD.

R U S T L E S S
CORROSION AND HEAT-RESISTING
STAINLESS STEELS



DPC Contracts Awarded to Twelve Firms

Washington

• • • Defense Plant Corp., RFC subsidiary, has authorized the following contracts:

Northrop Aircraft, Inc., Hawthorne, Cal., to provide additional plant facilities in California at a cost in excess of \$1,100,000, making a total commitment of more than \$4,150,000.

Canton Drop Forging & Mfg. Co., Canton, Ohio, to provide plant facilities in Ohio at a cost in excess of \$4,000,000.

Armstrong Cork Co., Lancaster, Pa., to provide additional plant facilities in Penn-

sylvania at a cost in excess of \$40,000, making a total commitment of more than \$1,135,000.

Woodall Industries, Inc., Detroit, to provide additional plant facilities in Michigan at a cost in excess of \$125,000, making a total commitment of more than \$700,000.

McDonnell Aircraft Corp., St. Louis, to provide additional plant facilities in Missouri at a cost in excess of \$116,000, making a total commitment of more than \$650,000.

Westinghouse Electric & Mfg. Co., Pittsburgh, to provide plant facilities in Illinois at a cost in excess of \$435,000.

Benjamin Franklin Graphite Co., West

Chester, Pa., to provide additional equipment for a plant in Pennsylvania at a cost in excess of \$425,000.

Borg-Warner Corp., Detroit, to provide additional equipment for plants in Michigan and Indiana, at a cost in excess of \$50,000, making a total commitment of more than \$400,000.

International Harvester Co., Chicago, to provide equipment at a plant in Illinois at a cost in excess of \$50,000.

Sheffield Steel Corp., Houston, Tex., to provide additional facilities for a plant in Texas at a cost in excess of \$650,000, making a total commitment of more than \$24,000,000.

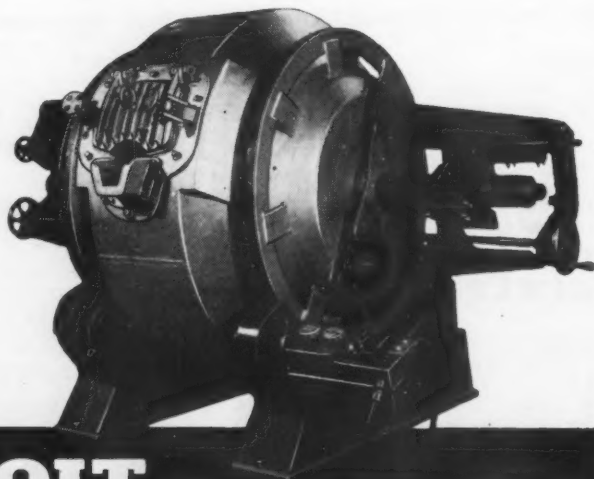
Aluminum Forgings, Inc., Buffalo, to provide additional equipment for a plant in Pennsylvania at a cost in excess of \$440,000, making a total commitment of more than \$9,425,000.

General Electric Co., Schenectady, to provide additional facilities at a plant in New York at a cost in excess of \$560,000, making a total commitment of more than \$3,500,000.

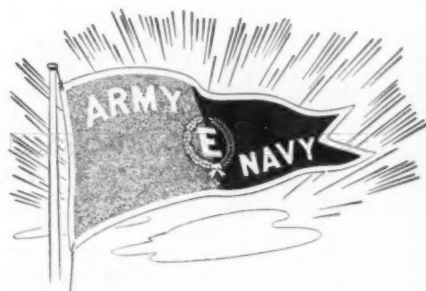


DETROIT Melting Furnaces for Precise Metallurgical Control

For close chemical and metallurgical control of any desired ferrous or non-ferrous alloys, the Detroit Rocking Electric Furnace with its exclusive, automatic stirring action under non-oxidizing conditions simply cannot be beaten. You can run a different mixture on each subsequent heat or the same alloy all day long with remarkable uniformity. Write today for complete facts about this fast melting, efficient, labor saving, money making foundry tool.



DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY MICHIGAN



Cited for Awards

• • • Listed below are the companies recently awarded the Army-Navy "E" for outstanding war production.

Union Boiler & Mfg. Co., Lebanon, Pa.
Crucible Steel Co., Harrison, N. J. (third star).

Bakelite Corp., Bound Brook, N. J. (second star).

Gibbs & Co., New York (second star).
Navy Yard, Brooklyn (second star).

United States Rubber Co., Ordnance Plant, Eau Claire, Wis.

Wald Mfg. Co., Inc., Maysville, Ky.
Western-Austin Co., Aurora, Ill.

Wilson & Co., Inc., Chicago.
Hughes-Keenan Co., Mansfield, Ohio.

Agawam Aircraft Products, Inc., Sag Harbor, N. Y.
American Art Metals Co., Inc., Atlanta, Ga.

Bard-Parker Co., Inc., Danbury, Conn.
Bermite Powder Co., Saugus, Cal.

Brown Steel Tank Co., Minneapolis.
Chicago Bridge & Iron Co., Shipbuilding Division, Seneca, Ill.

Gustin-Bacon Mfg. Co., Insulation Board Plant, Kansas City, Kan., and Rolagrip Pipe Coupling Division, Kansas City.

Hamilton Watch Co., Lancaster, Pa.
Hardie-Tynes Mfg. Co., Birmingham, Ala.

Improved Paper Machinery Corp., Nashua, N. H.

Mall Tool Co., Chicago.
Maxim Silencer Co., Hartford.

Metal Specialty Co., Cincinnati.
Modern Plumbing & Heating Co., Duluth.

U. S. Naval Ordnance Plant, Louisville.
Parkersburg Rig & Reel Co., O.C.S. Division, Coffeyville, Kan.

Philadelphia Gear Works, Inc., Philadelphia.

RCA Laboratories, Princeton, N. J.
Revere Copper & Brass, Inc., Baltimore.

Savannah Machine & Foundry Co., Savannah, Ga.

E. H. Scott Radio Laboratories, Inc., Chicago.

J. P. Seeburg Corp., Plants 1, 2 and 3, Chicago.

Stamford Rolling Mills, Springdale, Conn.
Tappan Stove Co., Mansfield, Ohio.

Todd-Johnson Dry Docks, Inc., Algiers, New Orleans.

F. W. Wakefield Brass Co., Vermillion, Ohio.
Wayne Pump Co., Fort Wayne, Ind.

Weicker Transfer & Storage Co., Denver.

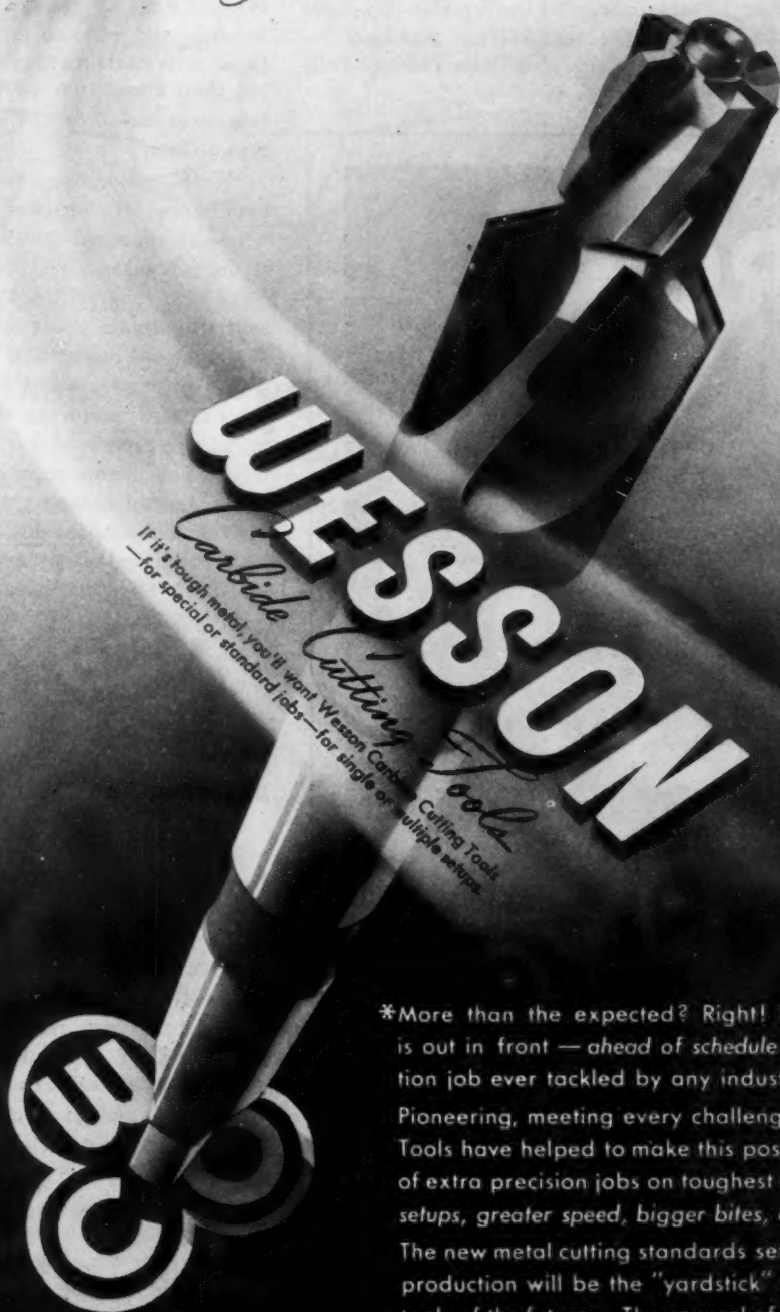
Williams Bros. Corp., Balboa, Canal Zone.

National Forge & Ordnance Co., Irvine, Pa. (third star).

HELPING THE

Aircraft Industry

DO MORE THAN
THE EXPECTED*



*If it's tough metal, you'll want Wesson Carbide Cutting Tools
—for special or standard jobs— for single or multiple setups.*

*More than the expected? Right! Today our Aircraft Industry is out in front — ahead of schedule — and the biggest production job ever tackled by any industry is practically "licked."

Pioneering, meeting every challenge, Wesson Carbide Cutting Tools have helped to make this possible — by making short work of extra precision jobs on toughest metals and alloys — with fewer setups, greater speed, bigger bites, and a minimum of rejects.

The new metal cutting standards set by Wesson in aircraft motor production will be the "yardstick" of performance for machine tools of the future. . . The counsel of Wesson engineers — skilled in engineering and designing of cutting tools — is available to help solve present war production problems, or for post-war planning.

WESSON CO., DETROIT, MICH. (Ferndale Station)

IN HAPPIER DAYS TO COME we will all have better, safer automobiles — more efficient refrigerators, washing machines and vacuum cleaners . . . farmers will have better, stronger tractors and other tools and machines . . . aircraft will continue to set new

standards in speed, comfort and safety . . . all made possible, in part, by the Wesson development of Carbide Cutting Tools to such high standards that they cut tougher metals than ever before — with greater precision — and at greater speed.

Steel Institute Meeting

(CONTINUED FROM PAGE 93)

with the composition necessary for good ballistic performance was considered highly impractical."

"Some of these problems are unique," he said. "In ordinary engineering practice, steel parts are designed for stresses well below their endurance limit, so that for all practical purposes the assembly will function indefinitely.

"However, special ordnance material makes use of steel stressed to its plastic range, well above the elastic limit. Guns, for instance, are locally stressed beyond their endurance limit at every shot. This produces progressive damage which would undoubtedly cause the gun to fail eventually.

"The reason the gun doesn't fail is that another factor, erosion, operates to end the useful life a gun long before stresses alone can produce failure."

"The fact the United States Army and Navy and United Kingdom now use the same aircraft bombs has simplified enormously our procurement problem in that direction," said the General. "We have, in cooperation with industry, standardized on spring formulae and materials. Also in cooperation with industry we have developed a set of standards for surface finishes, and reduced gages. Each of these achievements may appear small, but their cumulative effect has served to grease the skids and simplify mass production.

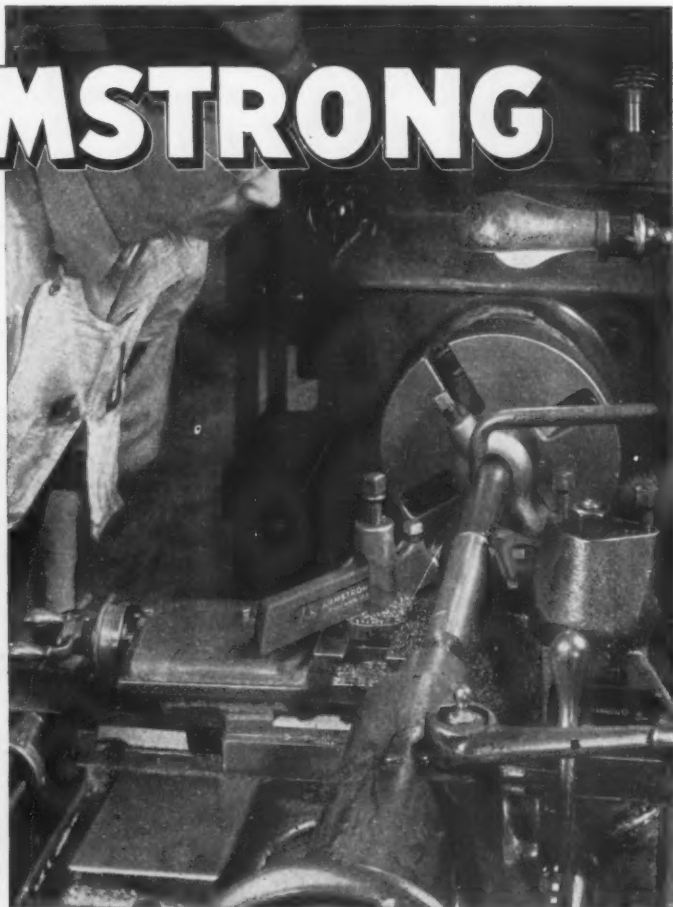
"We have borrowed freely from the experience of peace-time industry, where it appeared that such would be to our advantage. We now make some guns in a tube mill. We cast others centrifugally, a process developed by Watertown Arsenal. We have adopted flame hardening techniques for tank sprockets, wrist pins and cams. Worn parts are reclaimed by metal spraying. Experiments with powder metallurgy are approaching the period of fruition. Advances have been made in plating and other types of metal coating."

All officers of the Institute were re-elected. Also re-elected for a term of three years were 11 directors whose previous terms had expired. Walter S. Tower was re-elected president. Re-elected vice presidents were B. F. Fairless, president, United States Steel Corp., and Frank Purnell, president, Youngstown Sheet & Tube Co.; H. L. Hughes, vice president of the United States Steel Corp., was re-elected treasurer, and George S. Rose was re-elected secretary.

"I believe we are entering a new era of industrial relations," said C. L. Huston, Jr., of Lukens Steel Co., at one of the afternoon meetings. "The determination of industrial relations policies and their administration will undoubtedly be influenced by two viewpoints. On the one hand, the company is interested in preserving and enhancing its economic position, while at the same time, the union is anxious to insure its own security. To illustrate the union's point of view, companies are now asked not only to recognize the union on behalf of the company's employees but also on behalf of the union itself.

"We seem headed squarely to the same practices in bargaining that have long been followed in Britain and Sweden."

ARMSTRONG



The Aviation Industry has been built on modern steels, modern standards and MODERN TOOLS

A creation of modern times and forward-looking men, the Aviation Industry has probably the finest equipped shops and tool rooms in the world. It is significant that throughout "Aviation," ARMSTRONG TOOL HOLDERS are standard equipment. In the Armstrong System Aviation has found dependable, efficient tools for every operation on lathes, planers, slotters and shapers—modern ARMSTRONG TOOL HOLDERS that "Save: All Forging, 70% Grinding and 90% High Speed Steel"; that easily handle modern tough alloy steels at modern cutting speeds; that are always ready for work without expensive delays for tooling up.

With today's tremendous demands, close scheduling, where even minutes are expensive, requires dependable tools of absolutely certain performance—and Aviation has found the answer in ARMSTRONG TOOL HOLDERS.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

309 N. Francisco Ave., Chicago, U.S.A.

Eastern Warehouse & Sales: 199 Lafayette St., New York



ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms



OPA Announces Warehouse Price Zones in Six New Areas by June 22

• • • E. L. Wyman, chief of the OPA Steel Warehouse and Jobbers' Section, announced to members of the American Steel Warehouse Assn. convened here for its 34th annual meeting last Wednesday, that six new price zones for heavy line iron and steel warehouses had been established satisfactorily and that the new Amendment 15 to Price Schedule 49 was on the press. Official issuance

of the order is slated for June 10 to be effective on June 22. The sections of the country now zoned, as shown on the accompanying map, extend as far west as the extreme western edge of Montana and as far south as the southern border of Oklahoma and Arkansas but do not include the Solid South, Texas or the West Coast yet. Mr. Wyman stated that development work on

zoning for the balance of the nation was well under way and that complete zoning of the country was scheduled for about July 15.

Key basing point cities listed by OPA within the newly established price zones include:

- Zone 5**

 1. Buffalo
 2. Pittsburgh
 3. Cleveland
 4. Cincinnati
 5. Detroit
 6. Indianapolis
 7. Louisville
- Zone 6**

 8. Chicago
 9. Milwaukee
 10. Grand Rapids, Mich.
 11. Fort Wayne, Ind.
 12. Des Moines, Iowa
 13. Sioux Falls, S. D.
 14. Cheyenne, Wyo.
 15. Butte, Mont.
 16. Wichita, Kan.
 17. Tulsa, Okla.
 18. Little Rock, Ark.
- Zone 7**

 19. St. Paul
 20. Minneapolis
 21. Duluth
 22. Bismarck, N. D.
- Zone 8**

 23. St. Louis
 24. Granite City, Ill.
- Zone 9**

 25. Omaha, Neb.
 26. Lincoln, Neb.
- Zone 10**

 27. Denver, Colo.
 28. Pueblo, Colo.
 29. Colorado Springs, Colo.

WPB Issues a New CMP Regulation No. 1

• • • To bring it into conformity with all recent decisions the Controlled Materials Plan Division reissued CMP Reg. No. 1, May 29.

The amended regulation also provides that no person shall place an authorized controlled material order unless the amount of controlled material orders is within the related allotment received by him.

The new regulation also discloses the symbols which will be assigned to the various war programs as follows:

War Department	W
Ordnance	O
Navy Department	N
Maritime Commission	M
Aircraft Resources Control Office	C
Lend-Lease	L
Economic Warfare	E
Civilian Requirements	S
Department of Agriculture	A
Office of Defense Transportation	T
Rubber Director	R
Petroleum Administration	P
National Housing Agency	H
Office of War Utilities	U

The symbol "F" will be used by several Claimant Agencies to identify certain construction programs; the symbols "B, G, J and K" will be used to identify certain B product programs; the symbol "D" will be used to identify certain programs covering items destined for the Dominion of Canada, and the symbol "RO" will be used by regional offices of the WPB. The symbols "B, D, F, G, J, K and RO" constitute Claimant Agency symbols for the purpose of all CMP regulations.

U. S. Pig Iron Production in April (Source: American Iron & Steel Institute)

UNITED STATES BLAST FURNACE CAPACITY AND PRODUCTION—NET TONS

	PRODUCTION						
	PIG IRON		FERRO MANGANESE AND SPIEGEL		TOTAL		
		April	Year to Date	April	Year to Date	Current Month	Year to Date	Percent of Capacity April
DISTRIBUTION BY DISTRICTS:							
Eastern.....	916,569	3,717,862	24,349	85,327	940,918	3,803,189	88.9
Pittsburgh-Youngstown.....	2,070,049	8,389,490	21,273	81,194	2,091,322	8,470,684	98.8
Cleveland-Detroit.....	506,791	2,016,143			506,791	2,016,143	100.6
Chicago.....	1,064,464	4,294,866			1,064,464	4,294,866	98.9
Southern.....	336,165	1,359,328	14,544	73,648	350,709	1,432,976	98.3
Western.....	80,974	306,272			80,974	306,272	86.8
TOTAL.....	4,975,012	20,085,961	60,166	240,169	5,035,178	20,326,130	96.6

During 1942 the companies included above represented 99.8% of the total blast furnace production.

PERSONALS

• **Bert Conway**, former General Motors Corp. executive, has been named manufacturing coordinator for the Aviation Corp. He will be in direct charge of production and tooling at all Aviation Corp. plants, with his office located in Detroit. Mr. Conway has been manager of the Chevrolet Toledo plant, general master mechanic of the Pontiac plant at Detroit and in recent years was in charge of production testing at Allison.

• **J. N. Rolston** has been appointed assistant general sales manager of the Sullivan Machinery Co., Michigan City, Ind. Mr. Rolston has had 13 years of experience with the company including 5 years as assistant general manager of the company's Canadian subsidiary.

• The appointment of **J. H. Graft**, assistant district manager of the Youngstown district of Republic Steel Corp., as assistant district manager of the Buffalo district; of **E. A. Schwartz**, chairman of the company's open hearth committee, as assistant district manager at Youngstown; and of **M. D. Wald**, superintendent of blast furnaces and coke works in the Cleveland district, as assistant district manager of the Warren district, was announced this week. Mr. Graft joined Republic Steel Corp. in 1936, coming from Youngstown Sheet & Tube Co. Mr. Schwartz, also formerly with Youngstown Sheet & Tube Co., came to Republic in 1940. Mr. Wald left Midland Steel Products Co. in 1916 to come with Corrigan-McKinney Steel Co., which is now part of Republic Steel Corp.

• **Louis G. Marini** has been appointed assistant general manager of the Alloy Rods Co., York, Pa. Mr. Marini was formerly process engineer in charge of production of arc welding electrodes for the Westinghouse Electric & Mfg. Co., Trafford, Pa.

• **Ralph F. Peo**, vice-president and general manager of the Houde Engineering Division of Houdaille-Hershey Corp., has been appointed head of the special aircraft division for the United War & Community Fund drive in Buffalo.

• **John P. Maddigan**, Buffalo industrialist, has resigned as president of the Buffalo Structural Steel Corp. and has been succeeded by **Paul Schieve** of the Schieve Construction Co., steel erectors, also of Buffalo. Mr. Maddigan will remain on the board and retain his stock interests in the company.

• **O. B. White**, former acting manager of the Wisconsin Bearing Co., Milwaukee, has been made sales manager. He formerly was sales manager of the Berry Bearing Co., Chicago.

• **Nevin Reynolds**, assistant production foreman at Ampco Metals, Inc., Milwaukee, and **Arnold Kowalski**, junior engineer for the Allen-Bradley Co., Milwaukee, have been commissioned ensigns in the navy.

• **Harry R. Nagel**, assistant production manager for the Bucyrus-Erie



BERT CONWAY, manufacturing coordinator for the Aviation Corp., Detroit.

Corp., Milwaukee, and **Albert W. Draves**, president of the Wisconsin Carburetor Co., Milwaukee, have been commissioned first lieutenants in the army.

• **S. F. Briggs** was reelected chairman of the board of directors of the Briggs-Stratton Corp., Milwaukee, at its annual meeting. Other officers re-elected were: **C. L. Coughlin**, president; **H. M. Stratton**, vice-president; **R. W. Griffith**, vice-president in charge of manufacturing; **E. V. Oehler**, vice-president in charge of sales; **E. Bodendoerfer**, treasurer; **L. G. Regner**, secretary. **Hugh S. Brown** was elected vice-president in charge of engineering.

• **M. J. Matthews** was appointed superintendent of the sheet metal division of Cadillac Motor Car Co. He succeeds **A. A. Weidman**, recently transferred to the Detroit Diesel Division.

• **Lawrence W. Wallace**, vice-president of the Trundle Engineering Co., Cleveland, was given an honorary degree of Doctor of Engineering by the Agricultural & Mechanical College of Texas, at the commencement exercises held recently.

The honorary degree is the second which Mr. Wallace has received. He was given the honorary degree of Doctor of Engineering by Purdue University in 1932.

For four years previous to joining the Trundle organization, Mr. Wallace was director of engineering research of the Crane Co. He joined the Trundle Engineering Co. in 1941.

• **Cornelius B. Dorgan** has been appointed factory manager of the Cleveland Welding Co., Cleveland. He takes over the position formerly held by **Harry Bound**, who died recently. Mr. Dorgan has been associated with the company for the past 30 years, 18 of which he served as master mechanic.

• **Harrison Hoblitzelle** was recently elected president of the General Steel Castings Corp., Eddystone, Pa. Other officers elected were **Harry M. Pflager**, senior vice-president, and **George L. Alston**, secretary and treasurer.

• **Roe S. Clark**, vice-president and treasurer of the Package Machinery Co., Springfield, Mass., was re-elected president of the National Metal Trades Association at its 45th annual convention and production conference. Other officers re-elected at the convention were: **H. H. Kerr**, North Quincy, Mass., first vice-president, and **George A. Sayler**, Cincinnati, second vice-president.

• **F. M. Beauregard** has been appointed works manager of Willys-Overland Motors. For the past two years Mr. Beauregard has been general works manager of the Crosley Corp., Cincinnati. Prior to that time he was associated with Nash-Kelvinator Corp. for eleven years, serving at different times as works manager of the automotive division in Kenosha, Wisconsin, and production superintendent of the Kelvinator division in Detroit.

• **Dr. C. Earl Webb**, designer of bridges and western division engineer of the American Bridge Co., Chicago, has been elected president of the Western Society of Engineers for the year 1943-1944. Dr. Webb is a civil engineer, a graduate of Michigan State College, and is a member of a number of professional and honorary engineering societies. He is noted for his design work on some of the largest railroad and motor traffic bridges in this country. A number of vertical

lift type bridges have been built following his original design made in 1924. He was also during 1933 in charge of development of the erection schemes for the suspension span towers and the cantilever spans for the San Francisco-Oakland Bay bridge.

• **C. E. Jarchow**, comptroller of the International Harvester Co. since April, 1936, has been elected a vice-president of the company. Mr. Jarchow will continue as comptroller, his new title being vice-president and comptroller. Mr. Jarchow entered the employ of the Harvester company 29 years ago in the accounting department. Prior to that he had been in the employ of American Steel Foundries, and in 1913, at the age of 22, he had received his degree as a Certified Public Accountant.

• **A. E. Higgins**, vice-president and sales manager for the Pittsburgh Equitable Meter Co.—Merco Nordstrom Valve Co., Pittsburgh, has been commissioned a major in the U. S. Air Corps. He was called immediately for active duty.

• **Raymond R. Ridgway**, associate director of research for Norton Co., Worcester, Mass., was awarded the Jacob F. Schoellkopf medal for 1943 at the meeting of the western New York section of the American Chemical Society at Niagara Falls, N. Y., on May 20. Mr. Ridgway has been with Norton Co. since 1922 and is recognized as one of the outstanding research men in electrochemistry.

• The appointments of **A. H. Roosma** as assistant manager of the Southern district of Republic Steel Corp., and of **E. M. Kropp** as Mr. Roosma's successor as chief industrial engineer of the company, were announced recently. Mr. Roosma has been chief industrial engineer since 1935, coming with Republic Steel in 1930 as an industrial engineer. Mr. Kropp, who has been assistant chief industrial engineer, joined Republic Steel Corp. in 1930. **Peter Robertson**, assistant chief industrial engineer in charge of the manufacturing division, now assumes supervision over steel plants as well.

• **Louis C. Beale**, a recent graduate in chemical engineering from Ohio State University, has been appointed to the research staff of Battelle Memorial Institute, Columbus, Ohio, and assigned to its division of non-ferrous metallurgy.

• **James H. Purves** has been elected to the newly created position of assistant treasurer and assistant secretary of the Westinghouse Electric & Mfg.

Co. Mr. Purves has been investment manager and administrator for the company's paymasters and bank deposits since 1938. He will continue in that capacity.

• **Dr. Roger H. Lueck**, director of research of the American Can Co., was awarded the degree of honorary Doctor of Science for outstanding contributions in science and industry during the commencement program at Carroll College, Waukesha, Wis.

• **Randolph L. Fort**, who has served for the past year as assistant director of public relations for the Tennessee Coal, Iron & Railroad Co., Birmingham, has joined the American Red Cross and following completion of training will be sent on duty overseas.

• **A. J. Wheeldon**, for 22 years rolling mill superintendent for Wickwire Spencer Steel Co., Buffalo, has retired. He has been succeeded by **Curtis A. Gordon**, who joined the plant May 1, coming from Rustless Iron & Steel Co., Baltimore.

• **William G. White**, former freight trainmaster at Port Morris, N. J., has been named superintendent of the Buffalo division of the Delaware, Lackawanna & Western Railroad. He succeeds **John H. Lerbs**, transferred to Bangor, Pa., as freight trainmaster.

• **Glenn C. Paxton**, former production manager for the Morrison Engineering Corp., Cleveland, has been appointed production manager for the Industrial Oven Engineering Co., also of Cleveland. Mr. Paxton began his engineering career in the electrical field, and entered oven engineering in 1917 with the Electric Furnace Co., Salem, Ohio. He later became factory superintendent for the McCann-Harrison Corp., Cleveland.

• **Walton L. Woody** has been elected vice-president in charge of operations of the National Malleable & Steel Castings Co., Cleveland. Mr. Woody has been assistant to the president and in charge of the Sharon, Pa., and Melrose Park, Ill., works. He joined the company in 1914.

OBITUARY...

• **Edsel Ford**, 49, president, Ford Motor Co., Detroit, died May 26 at Grosse Pointe Shores, Mich.

• **L. D. Burr**, assistant treasurer of Sloss-Sheffield Steel & Iron Co., Birmingham, from 1917 to 1931, died May 18. He was 69 years old.

• **Edmund N. Morrill**, professor of metallurgy at Columbia University until his retirement last year, died at Long Branch, N. J., May 18.

• **Charles E. McCarthy**, production manager of Wickwire Spencer Steel Co. plant, Clinton, Mass., died May 21, aged 45 years. He was associated with the Wickwire Spencer Co. more than 20 years.

• **Fred Page Harris**, manager of the purchasing division of General Electric Lamp Department, Cleveland, died May 23, aged 66 years. He had been with General Electric's lighting division since 1904.

• **Stanley Keleske**, president of the Wisconsin Screw Co., Racine, Wis., died May 23.

• **Brig. Gen. Lyman Parsons Hubbell**, 68, former president, Fillmore Avenue Foundry & Iron Works, Inc., Buffalo, died May 21 in that city.

• **Frank H. Smith**, 77, who retired in 1936 as western division manager in Chicago, Magnus Co., Inc., now Magnus Metal Corp., died May 22 in Sarasota, Fla. He had been associated with the company 50 years.

• **Herbert R. Owen**, vice-president, Landers, Frary & Clark Co., New York, died May 22 at New Rochelle, N. Y.

• **Adna W. Gibson**, 49, in charge of lubricating oil department of Standard Vacuum Oil Co.'s South China division at Hong-kong until Japan went to war against the United States, died May 18 at Rochester, N. Y.

• **Dana Ripley Bullen**, 78, assistant to the vice-president, General Electric Co., Schenectady, N. Y., until his retirement ten years ago, died recently.

• **Harry F. Plagenz**, vice-president and treasurer, Cuyahoga Spring Co., Cleveland, died May 21 in that city.

• **Frederic McCleery**, 46, purchasing agent, Sharon Steel Corp., Sharon, Pa., died recently in that city.

• **Frederick Krick**, 46, superintendent for past ten years, Cleveland division, Pennsylvania railroad, died in Cleveland May 21.

MACHINE TOOLS

... News and Market Activities

Stabilization Is Problem at Cincinnati

Cincinnati

• • • The machine tool market reflects no interesting feature. Management continues to wrestle with the same problems that have bedeviled industry during the entire period of the war, with some becoming more pressing and others apparently for the moment are slow. At present, the wage stabilization order of the President is causing quite a bit of confusion in the area, because of the lack of proper and clear interpretation of just what is a wage increase and what is not. In some instances plants were without a carefully defined wage policy, except insofar as they had a general policy of recognizing merit and paying accordingly, but the Labor Board has seen fit to rule out such policy and is insisting upon a pretty clearly defined classification with wage rates set up for them. Of course, in line with the same proposition, industry is still having some difficulty with the question of employment and the problem of shifting over to a heavier female personnel continues to engage attention.

Business has quieted down somewhat, although manufacturers still report a fair quantity of new business.

Pooling of Equipment Being Tried at Cleveland

Cleveland

• • • The settlement of cancelled or cutback Ordnance contracts always involve facilities such as jigs, fixtures, machine tools, etc., which must be paid for by the government. One method of realizing the cost of these items has been in selling them. The Cleveland Ordnance Department attempts to dispose of such items directly from a contractor's plant, paying the prime contractor any handling costs involved.

However, in any normal operation, there is considerable equipment that cannot be sold quickly, and this equipment is being pooled by the Ordnance Department. Such a pooling of equipment has been going on for about eight months in the Cleveland area, and offers a ready inventory of tools, jigs, fixtures, and other similar items. In individual plants, these items may

not be of any specific use to anyone, but when pooled with many other similar items will help in setting up or expanding operations of manufacturers.

In addition to transferring tools and equipment from one plant to another in the district, this pooling arrangement acts as a cushion in preventing undue delays in getting manufacturing facilities set up because of lack of tools and fixtures.

Much of this equipment has been distributed throughout the district, and some has even found its way into areas that American troops have occupied. In most such instances the equipment is used mainly for service and repairs. A three-month turnover of such stocks of equipment is aimed at, and so far has been carrying through to a great extent.

Price Change Affects Used Machinery Ceilings

• • • Two corrections affecting the depreciation rates used in computing maximum prices for second-hand machines and parts were announced May 27 by the OPA.

One of the changes makes clear that in calculating the period of depreciation the computation of the depreciation rate should begin with the date of acquisition by the original purchaser for use. By limiting the definition of an original purchaser to a purchaser for use and excluding original purchasers who buy machines and parts merely for resale and not for use, the change clarifies the provisions in MPR 136 relating to ceilings for second-hand machines and parts computed by the prescribed depreciation method.

The change is accomplished by Amendment 87 to Regulation 136, effective June 2, by inserting the words "for use" after the words "original purchaser" in the provisions affecting second-hand machines and parts.

The second change affects the provisions setting forth the method of determining maximum prices for machines and parts sold by DPC. By changing the language in the provisions, depreciation for these sales is to be figured from the date of initial use after acquisition by the DPC. The words "installation and" were deleted

in these provisions because the installation date and initial use date in many cases were different.

Control Shortage Delays Welding Equipment Makers

Cleveland

• • • Greatest hampering factor in the production of vitally needed welding equipment is reported to be the shortage of electrical control and actuating equipment. Welding machine builders point out that deliveries of such equipment range from one to three months behind their production schedules. Larger manufacturers of such equipment, such as Westinghouse and General Electric, find themselves in the tightest spot in this regard, both because of their other war activities and because many newcomers into the welding machine field have placed additional burdens on their productive capacities.

Recent formation of a company in Detroit for the express purpose of reconditioning and salvaging electronic tubes, which are the heart of such control systems, marks a new frontier in salvaging.

Construction Machinery is Expedited by Special Section

Washington

• • • Production of construction machinery is being successfully expedited by a special section set up for that purpose within WPB's construction machinery and equipment division according to a report issued by the division.

The report shows that 165 requests for assistance in obtaining necessary material have been received by the section from various manufacturers within the past five weeks. In all cases the section has either expedited the orders for critical material or made surveys for the applicants on the situations of their purchase orders for such material.

Johnson Resigns, Chafee Made Director of Machine Division

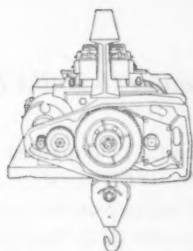
Washington

• • • George H. Johnson, who has acted as director of the WPB Machine Tools Division, resigned May 27. John S. Chafee, former deputy director of the Division, will succeed Mr. Johnson.

WACO

Speeds Work with **NUMBER CENSORED** R & M Cranes!

Their Safe, Accurate Performance Rushes Assembly and Shipment



This is the R & M All-Steel Hoist (with cover removed) with which many R & M Cranes are equipped. It is precision-built from track to hook, powered by a famous R & M Motor, and equipped with an over-size, oil-cooled, automatic load brake. Hoisting mechanism is extremely accessible—may be easily withdrawn when cover is removed. Compact design provides low head-room and maximum lift.



The R & M Cranes at Waco Aircraft are used in the glider assembly and crating departments. They are single I-Beam, 3-motor, 10-ton, 3-truck underhung cranes, each of which has a 67 ft. span and push-button, floor-controlled, variable speeds up to 150 f.p.m. The R & M Hoists are all-steel with 5-ton capacity and 2-speed control. Cranes are equipped with interlocks at one end so that the hoists can be transferred from one to another, enabling operator to control a maximum of 10 tons over a floor space 135 feet long.

IN the spanking new plant of the Waco Aircraft Company, glider parts do plenty of flying long *before* they become gliders! From raw materials to sub-assemblies, completed fuselages and final shipment (see above), R & M 10-ton cranes convey them "air express"—saving precious time and labor.

In *your* plant, R & M cranes can provide the same advantages. Depending on the type you need, we can make delivery in 3 to 6 months—the longer period necessary on larger types. And whichever model you choose from our line, from ½ ton to 25 tons in capacity, you have the assurance of performance, dependability and economy proved in every industry in the country during the past 14 years.

Why not have an R & M hoist and crane expert inspect your plant and recommend the R & M crane he knows will do the job best? Or, if you prefer, we will send you our new 16-page Bulletin No. 825 C.

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NON-FERROUS METALS

... News and Market Activities

Patino Official Refutes U.S. Report

• • • In sharp contrast to the findings of the official U. S.-Bolivian Commission on wages and working conditions in Bolivian tin mines, Claude F. Garesche, vice-president of Patino Mines & Enterprises Consolidated, Inc., maintained before his annual stockholders' meeting that the miners "receive high pay, free housing and schooling, medical and dental care, and have been protected against cost-of-living increases to the extent that they pay only 5c. a lb. for filet mignon steak." Despite this, he told the stockholders, the company finds it difficult to secure workers to man the mines.

In addition to the "finest hospital in the whole state of Bolivia," Garesche said, the miners and their families are entitled to the use of a golf course, tennis courts, a baseball diamond, a motion picture theater and mineral baths. "Much of the criticism of working and living conditions," he said, "has been based on distorted information and a failure to appreciate the difference between the U. S. and Bolivia. It is clear that some Americans who have concerned themselves with conditions in the Bolivian mines have sought to compare them with the highest standards in the U. S." Turning to other matters, Garesche said that it was difficult to predict dividend possibilities for the coming year. A recent report by a London financial journal estimated that British investors, dominant in Patino Mines & Enterprises, earned 31.6 per cent on their Bolivian holdings in 1942.

An analysis of Bolivian working conditions was made recently by Victor Andrade, a conservative deputy and manager of the Workers' Savings Bank of La Paz. On the wages in the tin mining industry, Andrade reports: "Twenty-six per cent of the miners receive less than 13 bolivianos a day (35c.), 41 per cent receive less than 20 bolivianos, 66 per cent less than 30, and 97 per cent less than 40." The chewing of coco leaves is widespread among the miners because of long working hours at the altitude of 15,000 ft. More of this drug is sold in company stores than of any basic food. About 9 per cent of the miners, Andrade reports, are permanently incapacitated annually by accidents and

occupational diseases, principally tuberculosis and silicosis. There are 425 doctors in Bolivia. Officials of the Patino company cannot fail to recognize that the price which is being paid for Bolivian tin, 60c. a lb. or £333.10 per ton f.o.b. port of exportation in South America, is already at inflated levels and that the dangers confronting the Bolivian tin mining industry would increase if, as reported, the Bolivian producers are granted a further increase in price for the ostensible purpose of improving the living and working conditions of the tin miners in that country.

New Magnesium Plant in Operation

• • • The first of the units of the new government-owned magnesium plant at Spokane, Wash., went into operation May 25, the Aluminum and Magnesium Division of WPB has announced.

The plant is being built and operated by the Electro Metallurgical Co., a subsidiary of the Union Carbide & Carbon Corp., for the government's Defense Plant Corp.

Completed in 11 months from the time construction work was started, the new plant is a completely integrated mill for the production of magnesium from dolomite by a thermal reduction method. Capacity of the plant, when it is in full operation by the end of this year, will be approximately four times the entire annual pre-war production of the entire United States.

The metallic magnesium to be produced in the Spokane plant will draw on raw materials found in the region. The method for the production, and the furnaces and equipment were designed by the Electro Metallurgical Co. In this process, calcined dolomite is smelted with ferrosilicon in large electric furnaces. Dolomite is abundant in the Spokane region, while the large amount of electric power required is obtained from the Grand Coulee Dam hydroelectric development.

Calcium Available in Small Lots

• • • Industrial users of calcium metal may obtain small quantities for

consumer use under an amendment of Conservation Order M-303, issued by WPB May 25. Order M-303, effective April 1, 1943, established control over all uses of calcium metal. Now, however, those industrial users who require small quantities are permitted to accept and use three lb. of calcium metal in the form of carrots, an impure form of the metal, or two lb. of calcium metal in any other form per month, without specific authority of WPB.

Cable Companies to Build Up Inventories

• • • Major cable companies have been ordered by WPB to ship a definite amount of copper cable into their regular warehouses each month. This step was taken to forestall any possible shortages in either emergency or regular production requirements for cable in the mining industry. Results from the order should be evident as soon as shipment can be made to the respective warehouses in June. Cables accumulated in warehouses will be available for withdrawal, as the requirements of the mining industry demand, by the mine's certification of its serial number or the certification of a mine serial number by a manufacturer.

Idle Aluminum to Be Reported

• • • In reply to inquiries regarding the reporting of supplies of idle aluminum, the Redistribution Division of WPB announces owners of aluminum should report their holdings on Form WPB 667. This form can be obtained from Murray Cook, 155 E. 44th St., New York. Mr. Cook is the agent for Metals Reserve Co., the federal corporation which carries out purchases of idle aluminum stocks for WPB.

The inquiries followed announcement on May 4 that owners of unreported aluminum which became idle as a result of WPB conservation orders, and which is suitable only for remelting to war use, would come under the current higher-than-scrap price schedule if such material was reported to WPB before June 30. Idle materials which are reported after that date, and which cannot be used in their present forms, will be directed into the regular scrap market.

NON-FERROUS PRICES

Refiner, Smelter Quotations

(Cents per lb.)

Copper, electrolytic, Conn. Valley.....	12.00
Copper, electrolytic, New York.....	11.75
Copper, Lake.....	12.00
Tin, Straits, New York.....	52.00
Zinc, East St. Louis.....	8.25
Zinc, New York.....	8.67
Lead, St. Louis.....	6.35
Lead, New York.....	6.50
Aluminum, virgin 99+%, delivered.....	15.00
Nickel, electrolytic, base refinery.....	35.00
Magnesium, 99.9+%, carlots.....	21.50
Magnesium, 12-in. sticks, carlots.....	30.00
Cadmium, delivered.....	90.00

ALUMINUM, No. 12 foundry grade (No. 2), 14.50c. per lb.; steel deoxidizing grades, 12.50c. to 14.75c. per lb. ANTIMONY, Asiatic, New York, nominal; American, 14.50c. a lb., f.o.b. Laredo, Tex., smelter. MERCURY, \$191 to \$193 per 76-lb. flask, f.o.b. shipping point or port of entry. BRASS INGOTS, commercial 85-5-5 (No. 115), 12.25c. a lb. COBALT, 97 to 99 per cent, \$2.11 per lb. BERYLLIUM COPPER, 3.75 to 4.25 per cent Be., \$15 per lb. contained Be. GOLD, 17. S. Treasury, \$35 an oz. INDIUM, 99.5 per cent, \$10 per troy oz. IRIIDIUM, \$165 per troy oz. PALLADIUM, \$24 per troy oz. PLATINUM, \$35 per oz. SILVER, open market, New York, 44.75c. per oz. ARSENIC, prime, white, 99 per cent, 4c. per lb.

Copper, Copper Base Alloys

(Mill base prices)

Sheet: Copper, 20.87c.; high brass, 19.48c.; low brass, 80 per cent, 20.15c.; red brass, 85 per cent, 20.36c.; commercial bronze, 90 per cent, 21.07c.; 95 per cent, 21.28c.; manganese bronze, 28.00c.; muntz metal, 22.75c.; naval brass, 24.50c.; phosphor bronze, grades A, B, 5 per cent, 36.25c.; Everdur, Herculey, Olympic or equivalent, 26.00c.; nickel silver, 5 per cent, 26.50c.

Rods: Copper, hot rolled, 17.37c.; drawn, 18.37c.; free cutting brass, 15.01c.; low brass, 80 per cent, 20.40c.; red brass, 85 per cent, 20.61c.; commercial bronze, 90 per cent, 21.32c.; 95 per cent, 21.53c.; Muntz metal, 18.87c.; naval brass, 19.12c.; phosphor bronze, grades A, B, 5 per cent, 36.50c.; Everdur, Herculey, Olympic or equivalent, 25.50c.; nickel silver, 5 per cent, 28.75c.

Extruded Shapes: Copper, 20.87c.; architectural bronze, 19.12c.; manganese bronze, 24.00c.; Muntz metal, 20.12c.; naval brass, 20.37c.

ALUMINUM

Tubing: 2 in. O.D. x 0.065 in. wall; 2S, 40c. per lb. (1/2H); 52S, 61c. (O); 24S, 67 1/2c. (T).

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c. per lb.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base price for tubing; 30,000-lb. base price for plate, flat stock. Variations from the above gage, size, temper, finish and quantity require extras.

Extruded Shapes: "As extruded" temper; 2000-lb. base price, 2S and 3S, factor No. 1 to 4, 25.5c. per lb.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28 1/2c.

The factor is determined by dividing perimeter of shape by the weight per lineal foot. All prices above are subject to factor number range, temper, length, dimensional tolerances and quantity extras.

Wire, Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: 1/4 in., 28 1/2c. per lb.; 1/2 in., 26c.; 1 in., 24 1/2c.; 2 in., 23c. Hexagonals: 1/4 in., 34 1/2c. per lb.; 1/2 in., 28 1/2c.; 1 in., 25 1/2c.; 2 in., 25 1/2c. 2S, as fabricated, random or standard lengths, 1/4 in., 24c. per lb.; 1/2 in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths, 0.093-0.187 in.

thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27 1/2c.

Variation from the above size, temper, finish and quantity require extras.

NON-FERROUS SCRAP METAL QUOTATIONS

Copper, Copper Base Alloy

(Current OPA maximum prices, cents per lb., f.o.b. point of shipment, plus premiums for quantities and special preparation.)

Group 1

No. 1 wire, No. 1 heavy copper..	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper.....	9.75
No. 2 wire, mixed heavy copper..	8.75
Copper tuyeres.....	8.75
Light copper.....	7.75
Copper borings.....	9.75
Lead covered copper wire, cable..	6.00*
Insulated copper.....	5.10*

Group 2

Bell metal.....	15.50
High grade bronze gears.....	13.25
High grade bronze solids.....	11.50*
Low lead bronze borings.....	11.50*
Babbitt lined brass bushings.....	13.00
High lead bronze solids.....	10.00*
High lead bronze borings.....	10.00*
Red trolley wheels.....	10.75
Tinny (phosphor bronze) borings..	10.50
Copper-nickel solids and borings..	9.25
Bronze paper mill wire cloth....	9.50
Aluminum bronze solids.....	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)...	9.00
Gilding metal turnings.....	8.50
Unlined standard red car boxes..	8.25
Lined standard red car boxes....	7.75
Cocks and faucets.....	7.75
Mixed brass screens.....	7.75
Red brass breakage.....	7.50
Old nickel silver solids, borings..	6.25
Copper lead solids, borings.....	6.25

Group 3

Yellow brass soft sheet clippings..	8.625
Yellow rod brass turnings.....	8.375
Zincy bronze borings.....	8.00
Fired rifle shells.....	8.25
Brass pipe.....	8.00
Old rolled brass.....	7.75
Admiralty condenser tubes.....	8.90
Muntz metal condenser tubes.....	7.50
Plated brass sheet, pipe reflectors	7.50
Manganese bronze solids.....	7.25 ¹
	6.25 ²
Manganese bronze borings.....	6.50 ¹
	5.50 ²
Yellow brass castings.....	6.25

Group 4

Automobile radiators.....	7.00
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Group 5

Refinery brass.....	5.00*
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*Price varies with analysis. ¹Lead content 0.00 to 0.40 per cent. ²Lead content 0.41 to 1.00 per cent.

MAGNESIUM

Sheet, rod, tubes, bars and extruded shapes are subject to individual quotation. Magnesium Metal Turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c. a lb.

Aluminum

(Current OPA maximum prices, cents per lb., f.o.b. point of shipment, plus premiums for quantities and special preparation.)

Plant scrap, segregated

2S solids.....	10.00
All other solids.....	9.50
Borings and turnings.....	7.50

Plant scrap, mixed

All solids.....	8.50
Borings and turnings.....	6.50

Obsolete scrap

Pure cable.....	10.00
Old sheet and utensils.....	8.50
Old castings and forgings.....	9.00
Pistons, free of struts.....	9.00
Pistons, with struts.....	7.00

For lots of 1000 to 19,999 lb., add 1c. to above prices except for old castings and forgings, pistons free of struts and pistons with struts for which there is a premium of 1/2c. a lb. For lots of 20,000 lb. or over add 1 1/2c. a lb. to prices listed above.

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings.....	8.00

Mixed, contaminated plant scrap

Grade 1 solids.....	11.00
Grade 1 borings and turnings....	7.90
Grade 2 solids.....	9.00
Grade 2 borings and turnings....	5.00

For lots of 1500 lb. and over add 1c. per lb.

Zinc

(Current OPA maximum prices, cents per lb., f.o.b., shipping point.)

New zinc clippings, trimmings...	7.25
Engravers', lithographers' plates..	7.25
Old zinc scrap.....	5.75
Unsweetened zinc dross.....	5.80
Die cast slab.....	5.80
New die cast scrap.....	4.95
Radiator grilles, old and new....	4.95
Old die cast scrap.....	4.50

Lead

Soft and hard lead, including cable lead, f.o.b. point of shipment, deduct 0.55c. per lb. from basing point prices for refined metal.

Nickel

Nickel content 98 + per cent, copper under 1/2 per cent, 26c. per lb.; 90 to 98 per cent nickel, 26c. per lb. of contained nickel.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer.....	25 1/2
Electrolytic, full size, 22 1/2c., cut to size.....	30 1/2
Rolled, oval, straight, 15 in. and longer.....	23 1/4
Curved.....	24 1/4
Brass: Cast, 82-20, elliptical, 15 in. and longer.....	23 1/2
Zinc: Cast, 99.99, 16 in. and over.....	16 1/4
Nickel: 99% plus, cast.....	47
Rolled, depolarized.....	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., for quantities, based on delivery from New York City)

Copper cyanide, tech., 100-lb. bbls.	34
Copper sulphate, 99.5 crystals, bbls. 1-5.....	5.65
Nickel salts, single, 425-lb. bbls.	13-13.5
Silver cyanide, 100 oz. lots.....	40.82-41 1/2
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33
Zinc sulphate, 89% crystals, bbls.	6.8

Dealers Aided by Price Revision

Washington

• • • Twelve changes in the provisions of Revised Price Schedule No. 4 designed to adjust pricing requirements to changing conditions in the iron and steel scrap field, were announced last Friday by OPA. The changes include establishment of provisions covering weights to govern the pricing of scrap shipments, the addition of new listed grades of scrap, the establishment of a "floor" of \$14 per gross ton for No. 1 heavy melting steel, and the designation of new "remote" points to which preparation in transit privileges will apply. The changes are made in Amendment 12 to RPS 4, and are effective May 29.

Weights to Govern. The general rule is established that settlement of all scrap shall be made on the basis of weights at the point of delivery. The amendment provides, however, that in rail shipment, if weights at the shipping point have been determined, no adjustment need be made for differences of 500 lb. or less per car between shipping point weights and weights at the point of delivery. If the difference exceeds 500 lb. per car, adjustment must be made for the full shortage in the car. For vessel shipments, weights at the dock prior to vessel movement, rather than weights at the point of delivery, are to govern. Exceptions are made for shipments of scrap by the Navy and Metals Reserve Co.

\$14 Floor. The \$13 per gross ton "floor" for No. 1 heavy melting steel with established differentials for other listed grades of steel scrap has been increased to \$14 per gross ton. The change in the "floor" price eliminates the \$1 per gross ton differential that certain Gulf Coast ports had over adjacent areas. The \$14 per gross ton "floor" for No. 1 heavy melting steel means that in computing the maximum shipping point price for No. 1 heavy melting steel, the shipping point price need not fall below \$14 per gross ton at any shipping point in the United States.

New Listed Grades. Additional grades of steel scrap are named in the Schedule. Pig scrap, ladle scrap, salamander scrap, skulls, skimmings, and iron and steel scrap reclaimed from slag dumps, are priced according to the percentage of iron content; if the material contains 85 per cent or more iron, it takes a differential of \$2 per gross ton under No. 1 heavy melting steel; a differential of \$4 per gross ton applies to an iron content of 75 to 85 per cent, and \$8 per gross ton to an iron content under 75 per cent. Mill scale is priced at \$8 per gross ton below No. 1 heavy melting steel. Mill cinder and grindings receive a maximum shipping point price of \$4 per gross ton at all shipping points in the United States.

"Remote" Scrap. The amendment designates the State of Arkansas as "remote," and all non-remote shipping points in Nebraska and Kansas are made "remote." By this designation, certain preparation-in-transit privileges may apply to scrap shipped from these areas. In addition, several modifications are made in provisions applying to purchases of remote scrap. The springboard limitation for "remote" scrap has been increased to \$7 from \$5 per gross ton. "Remote" scrap no longer requires the filing of bills of lading and sworn statements for scrap moving within the "remote" springboard limitation, nor is the filing of bills of lading required on "remote" scrap delivering over the \$7 "remote" springboard limitation and approved by OPA.

Basing Points, Claymont and Chicago. The amendment redefines the territorial limits of the Claymont and Chicago basing points. The Claymont basing point now includes the switching district of Chester, Pa., and the Chicago basing point includes the switching district of Gary, Ind.

Scrap for Use in Copper Precipitation. Detinned or tin-coated scrap sold for use in copper precipitation has been exempted from the Schedule.

Crushing of Turnings in Transit. The amendment extends a preparation-in-transit privilege to machine shop turnings or other grades of long turnings shipped in rail carload lots and crushed in transit. The maximum preparation fee allowable is \$2 per gross ton.

imum preparation fee allowable is \$2 per gross ton.

Briquetted Alloy Free Turnings. The special springboard limitation for alloy free turnings and certain other electric furnace grades produced in industrial plants in the State of Michigan and delivered to consumers in or nearest the Buffalo, New York, Pittsburgh, Brackenridge or Midland, Pa., basing points has been extended to briquetted alloy free turnings.

Electric Furnace Grades. The amendment allows electric furnace premiums to apply to electric furnace grades sold for use in the smelting of non-ferrous metals. This permits smelters to pay the same price that electric furnace acid open hearth and foundry consumers may pay for selected grades of steel scrap.

WPB Says Scrap Supply Not Comfortable

New York

• • • Merrill Stubbs, chief of the Industrial Salvage Branch, WPB, stated last week before the annual meeting of the National Steel Warehouse Assn. here, that the present scrap supply picture was not comfortable and that if the current trend continued our scrap supplies would diminish to a point where "we will be losing steel production from lack of scrap within two to six months." He praised the efforts of some 3000 warehouse salesmen who made over 30,000 calls last fall to bring in much heavy quality dormant scrap.

Refuting reports of a comfortable scrap supply situation, he said: "We are faced today with a real scrap shortage. It is a selective shortage. We have too many turnings and borings — too much of the lighter scrap and not enough heavy scrap. There is not only a shortage of the heavy melting grades of scrap, but there is also a geographic unbalance which reduces the effectiveness of the 7,000,000 ton inventory reported at the year-end.

"There has been a reduction of overall inventories every month since the first of the year. The trend is unfavorable. Many normal sources have dried up or have been replaced by supplies of undesirable grades. Much non-recurrent dormant scrap has been moved. A great deal of scrap has been exported in billets or semi-finished form from which there is no resultant production scrap."

He emphasized that the scrap inventory was a "working inventory," which did not allow reserves for such

developments as the late opening of Great Lakes shipping, the behind-schedule construction of new blast furnaces, or take into account the possibility of accident or attack on the locks at the Soo, which would cause a loss in pig production, or a prolonged coal strike.

Scrap Markets

BUFFALO—Delayed nearly two weeks by high river waters, barges laden with scrap iron from the Atlantic seaboard neared Buffalo this week, traveling via the state barge canal. Also still en route was a freighter bringing scrap from the Upper Lakes region. Meanwhile, local yards reported an unchanged situation, with mill stocks still in fair shape.

BOSTON—The gasoline shortage is already felt in the trade and unless the situation is shortly corrected will work a real hardship not only on shippers but consumers as well. Business the past week continued quiet and was confined largely to occasional cars of steel, turnings and bundled material. Little breakable cast was shipped.

CINCINNATI—Dealers indicate that the flow of material into yards has been slowing up, but the labor shortage in district yards is making it difficult for the trade to prepare even the volume of scrap that is now coming in. Most mills in the area, however, are comfortably supplied at the present time, with inventories estimated from three to four months.

BIRMINGHAM—Although receipts are little more than a dribble, steel mills in this area continue to be comfortably situated in so far as inventories are concerned. The quality of allocated scrap is good but mills are not being so favorably impressed with some of the unallocated variety that is being received.

SCRAP PRICES

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES											
	No. 1 & 2 Hyv. Mel. No. 1 Cp. Blk. Shts. No. 1 & 2 Bundles No. 1 Busheling	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shovelling Turnings	No. 2 Busheling	Low Phos.	Heavy Structural and Plate	Foundry Steel									
							Bar Crops, Punch- ings Plate Scrap	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crank-shafts	Alloy Free Low Phos. Sulphur Turnings	Heavy Axle and Forge Turn. First Furnace Cut Bundles			
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton.....	\$20.00	\$15.00	\$15.00	\$16.00	\$17.00	\$17.50	\$25.00	\$22.50	\$21.50	\$22.00	\$22.50	\$21.50	\$22.00	\$21.00	\$18.00	\$19.50	\$21.00	
Cleveland, Middletown, Cincinnati, Portsmouth.....	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50	
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point..	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75	
Ashland, Ky.....	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50	
Buffalo, N. Y.....	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25	
Bethlehem, Pa.; Kokomo, Ind....	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25	
Duluth, Minn.....	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00	
Detroit, Mich.....	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85	
Toledo, Ohio.....		12.85	12.85	13.85	14.85	15.35												
St. Louis, Mo.....	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50	
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburgh, Cal.; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00	
Minnequa, Colo.....	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50	
Seattle, Wash.....	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.50	15.00	12.50	14.00	15.50	

*Baled turnings are \$5 per gross ton higher.

BUNDLES: Tin can bundles are \$4 below dealers' No. 2 bundles No. 3 bundles are \$2 less than No. 1 heavy melting.

AT NEW YORK CITY or Brooklyn, the maximum shipping point price is \$15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is \$15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of \$6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburgh, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. *At Cincinnati, for basic open hearth grades, foundry steel and auto springs and crankshafts, deduct 80c. per ton.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakland, Cal.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing

point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton*, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.* For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be \$3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made \$4) less maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge \$2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1 per cent oil), \$1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), \$2 less than No. 1 heavy melting. If loaded in box cars add 75c.

UNPREPARED CAST IRON SCRAP—Except for heavy breakable cast, unprepared scrap is given a price ceiling of \$2.50 per ton less than the maximum prices for the corresponding grade of prepared cast iron scrap. Where scrap is to undergo preparation prior to arrival at the point of delivery, such scrap is not considered at shipping point until preparation is completed.

Consumers of cast scrap may pay the shipping point price plus established charge for transporting the scrap to their plants. In the case of deliveries by truck, the cast scrap buyer must obtain from the seller a certification, made out to OPA.

*At Memphis 50c.; Great Lakes ports \$1; New England \$1.25.

RAILROAD SCRAP							CAST IRON SCRAP			
	No. 1 RR Heavy Melting	Scrap Rails	Scrap Rails				No. 1 cupola cast.....	Group A	Group B	Group C
			3 ft. and Under	2 ft. and Under	18 in. and Under					
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown.....	\$20.50	\$21.50	\$23.00	\$23.50	\$23.75	\$24.00				
Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown.....	21.00	22.00	23.50	24.00	24.25	24.50	Clean auto cast.....	18.00	19.00	20.00
Chicago, Philadelphia, Sparrows Pt., Wilmington..	19.75	20.75	22.25	22.75	23.00	23.25	Unstripped motor blocks.....	15.50	16.50	17.50
Birmingham, Los Angeles, San Francisco.....	18.00	19.00	20.50	21.00	21.25	21.50	Stove Plate.....	17.00	18.00	19.00
Buffalo.....	20.25	21.25	22.75	23.25	23.50	23.75	Heavy Breakable Cast.....	15.50	16.50	17.50
Detroit.....	18.85	19.85	21.35	21.85	22.10	22.35	Charging Box Size Cast.....	17.00	18.00	19.00
Duluth.....	19.00	20.00	21.50	22.00	22.25	22.50	Misc. Malleable.....	20.00	21.00	22.00
Kansas City, Mo.....	17.00	18.00	19.50	20.00	20.25	20.50				
Kokomo, Ind.....	19.25	20.25	21.75	22.25	22.50	22.75	Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.			
Seattle.....	15.50	16.50	18.00	18.50	18.75	19.00	Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.			
St. Louis.....	18.50	19.50	21.00	21.50	21.75	22.00	Group C: States not named in A and B: switching district of Kansas City, Kan., Mo.			

Tool Steel Scrap Ceiling Prices Set by MPR 379, May 4, 1943

BASE PRICE SEGREGATED		BASE PRICE UNSEGREGATED SOLIDS		BASE PRICE UNSEGREGATED TURNINGS	
Solids, Lb. Cont. W	Turnings, Lb. Cont. W	\$1.50 per lb. contained W if 5% or more.	\$1.15 per lb. contained W if over 1% and less than 5%.	\$1.30 per lb. contained W if 5% or more.	\$1.00 per lb. contained W if 1% and less than 5%.
Type 1.....	\$1.80				
Type 2.....	1.60				
Type 3.....	1.25				
Type 4*.....	0.125	\$0.80 per lb. contained Mo if 1 1/2% or more.		\$0.70 per lb. contained Mo if 1 1/2% or more.	
Type 5*.....	0.135				

*Per lb. of scrap material.

Comparison of Prices . . .

Advances Over Past Week in Heavy Type; Declines in Italics.

[Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	June 1, 1943	May 25, 1943	May 4, 1943	June 2, 1942
Hot rolled sheets.....	2.10	2.10	2.10	2.10
Cold rolled sheets.....	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00

Tin and Terne Plate: (Dollars Per Base Box)	June 1, 1943	May 25, 1943	May 4, 1943	June 2, 1942
Tin plate, standard cokes	\$5.00	\$5.00	\$5.00	\$5.00
Tin plate, electrolytic...	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30

Bars and Shapes: (Cents Per Lb.)	June 1, 1943	May 25, 1943	May 4, 1943	June 2, 1942
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)...	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40

Wire and Wire Products: (Cents Per Lb.)	June 1, 1943	May 25, 1943	May 4, 1943	June 2, 1942
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55

Rails: (Dollars Per Gross Ton)	June 1, 1943	May 25, 1943	May 4, 1943	June 2, 1942
Heavy rails	\$40.00	\$40.00	\$40.00	\$40.00
Light rails	40.00	40.00	40.00	40.00

Semi-Finished Steel: (Dollars Per Gross Ton)	June 1, 1943	May 25, 1943	May 4, 1943	June 2, 1942
Rerolling billets	\$34.00	\$34.00	\$34.00	\$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00

Wire Rods and Skelp: (Cents Per Lb.)	June 1, 1943	May 25, 1943	May 4, 1943	June 2, 1942
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 154 and 163.

Pig Iron: (Per Gross Ton)	June 1, 1943	May 25, 1943	May 4, 1943	June 2, 1942
No. 2 fdy., Philadelphia...	\$25.89	\$25.89	\$25.89	\$25.89
No. 2, Valley furnace...	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti...	24.68	24.68	24.68	24.68
No. 2, Birmingham.....	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa...	25.39	25.39	25.39	25.39
Basic, Valley furnace....	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago...	31.34	31.34	31.34	31.34
Ferromanganese	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)	June 1, 1943	May 25, 1943	May 4, 1943	June 2, 1942
Heavy melt'g steel, P'gh...	\$20.00	\$20.00	\$20.00	\$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh...	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia.	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go.....	20.00	20.00	20.00	20.00

Coke, Connellsville: (Per Net Ton at Oven)	June 1, 1943	May 25, 1943	May 4, 1943	June 2, 1942
Furnace coke, prompt...	\$6.50	\$6.50	\$6.50	\$6.00
Foundry coke, prompt...	7.50	7.375	6.875	6.875

Non-Ferrous Metals: (Cents per Lb. to Large Buyers)	June 1, 1943	May 25, 1943	May 4, 1943	June 2, 1942
Copper, electro., Conn...	12.00	12.00	12.00	12.00
Copper, Lake, New York.	12.00	12.00	12.00	12.00
Tin (Straits), New York.	52.00	52.00	52.00	52.00
Zinc, East St. Louis...	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	22.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

Composite Prices . . .

FINISHED STEEL				PIG IRON				SCRAP STEEL			
June 1, 1943.....	2.25513c. a Lb.....			23.61 a Gross Ton.....				\$19.17 a Gross Ton.....			
One week ago	2.25513c. a Lb.....			23.61 a Gross Ton.....				\$19.17 a Gross Ton.....			
One month ago	2.25513c. a Lb.....			23.61 a Gross Ton.....				\$19.17 a Gross Ton.....			
One year ago	2.26190c. a Lb.....			23.61 a Gross Ton.....				\$19.17 a Gross Ton.....			
HIGH				HIGH				HIGH			
1943.....	2.25513c.,	2.25513c.,		\$23.61	\$23.61			\$19.17	\$19.17		
1942.....	2.26190c.,	2.26190c.,		23.61	23.61			19.17	19.17		
1941.....	2.43078c.,	2.43078c.,									
1940.....	2.30467c., Jan. 2	2.24107c., Apr. 16		\$23.61, Mar. 20	\$23.45, Jan. 2			\$22.00, Jan. 7	\$19.17, Apr. 10		
1939.....	2.35367c., Jan. 3	2.26689c., May 16		23.45, Dec. 23	22.61, Jan. 2			21.83, Dec. 30	16.04, Apr. 9		
1938.....	2.58414c., Jan. 4	2.27207c., Oct. 18		22.61, Sept. 19	20.61, Sept. 12			22.50, Oct. 3	14.08, May 16		
1937.....	2.58414c., Mar. 9	2.32263c., Jan. 4		23.25, June 21	19.61, July 6			15.00, Nov. 22	11.00, June 7		
1936.....	2.32263c., Dec. 28	2.05200c., Mar. 10		23.25, Mar. 9	20.25, Feb. 16			21.92, Mar. 30	12.67, June 9		
1935.....	2.07642c., Oct. 1	2.06492c., Jan. 8		19.74, Nov. 24	18.73, Aug. 11			17.75, Dec. 21	12.67, June 9		
1934.....	2.15367c., Apr. 24	1.95757c., Jan. 2		18.84, Nov. 5	17.83, May 14			13.42, Dec. 10	10.33, Apr. 29		
1933.....	1.95578c., Oct. 3	1.75836c., May 2		17.90, May 1	16.90, Jan. 27			13.00, Mar. 13	9.50, Sept. 25		
1932.....	1.89196c., July 5	1.83901c., Mar. 1		16.90, Dec. 5	13.56, Jan. 3			12.25, Aug. 8	6.75, Jan. 3		
1931.....	1.99626c., Jan. 13	1.86586c., Dec. 29		14.81, Jan. 5	13.56, Dec. 6			8.50, Jan. 12	6.43, July 5		
1930.....	2.25488c., Jan. 7	1.97319c., Dec. 9		15.90, Jan. 6	14.79, Dec. 15			11.33, Jan. 6	8.50, Dec. 29		
1929.....	2.31773c., May 28	2.26498c., Oct. 29		18.21, Jan. 7	15.90, Dec. 16			15.00, Feb. 18	11.25, Dec. 9		
				18.71, May 14	18.21, Dec. 17			17.58, Jan. 29	14.08, Dec. 3		

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, reductions, and in most cases freight absorbed to meet competition. Delivered prices do not reflect new 3 per cent tax on freight rates.

Basing Point ↓ Product													10 DELIVERED TO		
	Pitts- burgh	Chicago	Gary	Cleve- land	Birm- ingham	Buffalo	Youngs- town	Spar- rows Point	Granite City	Middle- town, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	Detroit	New York	Phila- delphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.22¢	2.35¢	2.28¢
Cold rolled ¹	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.17¢	3.41¢	3.39¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.75¢	3.68¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.47¢	3.73¢	3.69¢
Long ternes ²	3.80¢		3.80¢									4.55¢		4.18¢	4.14¢
STRIP															
Hot rolled ³	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.22¢	2.48¢	
Cold rolled ⁴	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.92¢	3.18¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.58¢	
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.07¢	3.33¢	
TIN MILL PRODUCTS															
Coke tin plate, base box	\$5.00	\$5.00	\$5.00						\$5.10					5.38¢	5.34¢
Electrolytic tin plate, box	\$4.50		\$4.50												
Black plate, 29 gage ⁵	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ ¹²			3.39¢
Mfg. ternes, special box	\$4.30	\$4.30	\$4.30						\$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.52¢	2.80¢	2.27¢	2.51¢	2.49¢
Rail steel ⁶	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.52¢	2.80¢			
Reinforcing (billet) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.52¢	2.55¢ ¹³	2.27¢	2.40¢	
Reinforcing (rail) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.52¢	2.55¢ ¹³	2.27¢		2.49¢
Cold finished ⁸	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)					3.01¢	2.99¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢		(Bethlehem, Massillon, Canton = 2.70¢)					2.82¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.47¢		
									(Coatesville and Claymont = 2.10¢)						
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.35¢		2.47¢	2.65¢	2.33¢	2.30¢	2.155¢
Floor plates	3.35¢	3.35¢									3.72¢	4.00¢		3.73¢	3.69¢
Alloy	3.50¢	3.50¢									3.97¢	4.15¢		3.71¢	3.60¢
									(Coatesville = 3.50¢)						
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.47¢	2.75¢		2.28¢	2.22¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢				(Worcester = 3.00¢)							
0.51 to 0.75 Carbon	4.30¢			4.30¢				(Worcester = 4.50¢)							
0.76 to 1.00 Carbon	6.15¢			6.15¢				(Worcester = 6.35¢)							
1.01 to 1.25 Carbon	8.35¢			8.35¢				(Worcester = 8.55¢)							
WIRE ⁹															
Bright ¹⁴	2.60¢	2.60¢		2.60¢	2.60¢			(Worcester = 2.70¢)				3.10¢			2.94¢
Galvanized															
add proper size extra and galvanized extra to bright wire base, above.															
Spring (High Carbon)	3.20¢	3.20¢		3.20¢				(Worcester = 3.30¢)				3.70¢			3.54¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.74¢

¹ Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. ² Unassorted 8-lb. coating. ³ Widths up to 12 in. ⁴ Carbon 0.25 per cent and less. ⁵ Applies to certain width and length limitations. ⁶ For merchant trade. ⁷ Prices for straight length material only, from a producer to a consumer. Functional discount of 25c. per 100 lb. to fabricators. ⁸ Also shafting. For quantities of 20,000 to 39,999 lb. ⁹ Carload lot to manufacturing trade. ¹⁰ These prices do not apply if the customary means of transportation (rail and water) are not used. ¹¹ Boxed. ¹² Portland and Seattle price, San Francisco price is 2.50c. ¹³ This bright wire base price to be used in figuring annealed and bright finish wires, commercial spring wire and galvanized wire.

GOVERNMENT CEILINGS—Price Schedule No. 6 issued April 16, 1941, governs steel mill prices; Price Schedule No. 49 governs warehouse prices which are on another page of this issue.

EXCEPTIONS TO PRICE SCHEDULE No. 6—On hot rolled carbon bars, Phoenix Iron Co. may quote 2.35c. at established basing points, Calumet Steel division of Borg Warner may quote 2.35c., Chicago, on bars from its 8-in. mill; Joslyn Mfg. Co. may quote 2.35c., Chicago base. On rail steel bars Sweets Steel Co. may quote 2.35c., f.o.b. mill. On hot rolled sheets, Andrews Steel Co. may quote for shipment to Detroit area on Middletown base. On galvanized sheets, Andrews Steel may quote 3.75c., at established basing points. On hot rolled strip, Joslyn Mfg. Co. may quote 2.30c., Chicago base. On plates, Granite City Steel Co. may quote 2.35c., f.o.b. mill, and Central Iron & Steel Co. may quote 2.20c., f.o.b. basing points. On shapes, Phoenix Iron Co. may quote 2.30c. established basing points and 2.50c. Phoenixville for export.

On rail steel merchant bars, Eckels-Nye Corp. may charge 2.40c. On tubing, South Chester Tube Co. may price Gulf or Pacific Coast all-rail shipments and shipments west of Harrisburg on basis of f.o.b. Chester. On lend-lease sales to eastern seaboard, Sheffield Steel Co. and Colorado Fuel & Iron Corp. may sell f.o.b. mill. **SEMI-FINISHED STEEL**—Follansbee Steel Corp. may sell forging billets at \$49.50 f.o.b. Toronto; Continental Steel Corp. may sell Acme Steel Co. at \$34 for re-rolling billets plus extras and freight; Ford Motor Co. may sell re-rolling billets at \$34 f.o.b. Dearborn; Andrews Steel Co. may sell forging billets at \$50 at established basing points and slabs at \$41; Empire Sheet and Tin Plate may sell slabs at \$41 at established basing points and sheet bars at \$39 f.o.b. mill; on lend-lease sales Northwestern Steel & Wire Co. may charge \$41 per gross ton f.o.b. mill for re-rolling billets; on lend-lease sales Wheeling Steel Corp. may charge \$36 per ton for small billets, f.o.b. Portsmouth and \$37 per ton for sheet bars f.o.b. Portsmouth; Laclede Steel Co. on semifinished sales for lend-lease shipped to eastern seaboard may use Chicago basing point prices f.o.b. Alton and Madison, Ill. **ALLOY STEEL BARS**—Texas Steel Co. may use Chicago base f.o.b. Fort Worth.

PRICES

WAREHOUSE PRICES

(Delivered Metropolitan areas, per 100 lb. These prices do not necessarily apply for dislocated tonnage shipments when the f.o.b. City prices are used in conformance with OPA Schedule 43)

Cities	SHEETS			STRIP		Plates 1/4 in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, 2300	Hot Rolled, 3100	Cold Drawn, 2300	Cold Drawn, 3100
*Philadelphia	\$3.518	\$4.872	\$5.018	\$3.922	\$4.772	\$3.605	\$3.686	\$3.822	\$4.072				
*New York	3.590	4.613	5.010	3.974	4.774	3.768	3.758	3.853	4.103	6.008	7.158	7.303	8.453
*Boston	3.774	4.744	5.224	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.312	7.344	8.494
*Baltimore	3.594	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052				
*Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165				
*Washington	3.596	4.841	5.196	4.041	4.741	3.796	3.930	3.941	4.041				
Pittsburgh	3.35	4.00	4.75	3.60	3.20	3.40	3.40	3.35	3.65	7.45	5.75	8.40	6.75
Chicago	3.25	4.10	4.85	3.60	3.50	3.55	3.55	3.50	3.75	7.35	5.65	8.40	6.75
Cleveland	3.35	4.05	4.62	3.50	3.20	3.40	3.58	3.25	3.75	7.55	5.85	8.40	6.75
Detroit	3.43	4.30	4.84	3.43	3.40	3.60	3.65	3.43	3.80	7.67	5.97	8.70	7.05
Buffalo	3.25	4.30	4.75	3.82	3.52	3.62	3.40	3.35	3.75	7.35	5.65	8.40	6.75
Birmingham	3.45	4.75	4.75	3.70	3.52	3.55	3.55	3.50	4.43				
St. Louis	3.39	4.24	4.99	3.74	3.61	3.69	3.69	3.64	4.02	7.72	6.02	8.77	7.12
St. Paul	3.50	4.35	5.00	3.85	3.83	3.80	3.80	3.75	4.34	7.45	6.00	8.84	7.44
Milwaukee	3.38	4.23	4.98	3.73	3.54	3.68	3.68	3.63	3.88	7.58	5.88	8.63	6.98
Cincinnati	3.42	4.37	4.92	3.67	3.45	3.65	3.68	3.60	4.00	7.69	5.99	8.50	7.10
Indianapolis	3.45	4.25	5.01	3.75	3.28	3.70	3.70	3.60	3.97	7.67	5.97	8.72	7.07
Omaha	3.85	4.77	5.52	4.20		4.15	4.15	4.10	4.42				
Memphis	3.85	4.66	5.25	4.10		3.95	3.95	3.90	4.31				
New Orleans	3.95	4.95	5.25	4.20		3.90	3.90	4.10	4.60				
Houston	3.75	5.43	5.25	4.30		5.25	5.25	3.75	4.50				
Los Angeles	4.95	7.15	5.95	4.90		4.90	4.60	4.35	5.70	9.55	8.55	10.55	9.55
San Francisco	4.55	7.55	6.60	4.50		4.65	4.35	3.95	5.55	9.80	8.80	10.80	9.80
Seattle	4.65	6.63	5.70	4.25		4.75	4.45	4.20	5.75		8.00		

N. E. STEELS

(Hot Rolled Mill Extras for Alloy Content)

Designa- tion	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Man- ganese	Phos- phorus Max.	Sul- phur Max.	Silicon	Chro- mium	Nickel	Molyb- denum	Bars and Bar Strip	Billets, Blooms and Slabs	Bars and Bar Strip	Billets, Blooms and Slabs
NE 1330	.28/.33	1.60/1.90	.040	.040	.20/.35				.10c	\$2.00		
NE 1335	.33/.38	1.60/1.90	.040	.040	.20/.35				.10	2.00		
NE 1340	.38/.43	1.60/1.90	.040	.040	.20/.35				.10	2.00		
NE 1345	.43/.48	1.60/1.90	.040	.040	.20/.35				.10	2.00		
NE 1350	.48/.53	1.60/1.90	.040	.040	.20/.35				.10	2.00		
NE 8020	.18/.23	1.00/1.30	.040	.040	.20/.35			.10/.20	.45	9.00	.95c	\$19.00
NE 8442*	.40/.45	1.30/1.60	.040	.040	.20/.35			.30/.40	.90	18.00	1.40	28.00
NE 8613	.12/.17	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8615	.13/.18	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8617	.15/.20	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8620	.18/.23	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8630	.28/.33	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8635	.33/.38	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8637	.35/.40	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8640	.38/.43	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8642	.40/.45	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8645	.43/.48	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8650	.48/.53	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00
NE 8720	.18/.23	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.20/.30	.80	16.00	1.30	26.00
NE 9255	.50/.60	.70/.95	.040	.040	1.80/2.20				.40c	8.00		
NE 9260	.55/.65	.75/1.00	.040	.040	1.80/2.20				.40	8.00		
NE 9262	.55/.65	.75/1.00	.040	.040	1.80/2.20	.20/.40			.65	13.00		
NE 9415	.13/.18	.80/1.10	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30c	\$26.00
NE 9420	.18/.23	.80/1.10	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30	26.00
NE 9422	.20/.25	.80/1.10	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30	26.00
NE 9430	.28/.33	.90/1.20	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30	26.00
NE 9435	.33/.38	.90/1.20	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30	26.00
NE 9437	.35/.40	.90/1.20	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30	26.00
NE 9440	.38/.43	.90/1.20	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30	26.00
NE 9442	.40/.45	1.00/1.30	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.85	17.00	1.35	27.00
NE 9445	.43/.48	1.00/1.30	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.85	17.00	1.35	27.00
NE 9450	.48/.53	1.20/1.50	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.85	17.00	1.35	27.00
NE 9537*	.35/.40	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.70	.15/.25	1.20	24.00	1.70	34.00
NE 9540*	.38/.43	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.70	.15/.25	1.20	24.00	1.70	34.00
NE 9542*	.40/.45	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.70	.15/.25	1.20	24.00	1.70	34.00
NE 9550*	.48/.53	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.70	.15/.25	1.20	24.00	1.70	34.00
NE 9630	.28/.33	1.20/1.50	.040	.040	.40/.60	.40/.60			.80	16.00	1.30	26.00
NE 9635	.33/.38	1.20/1.50	.040	.040	.40/.60	.40/.60			.80	16.00	1.30	26.00
NE 9637	.35/.40	1.20/1.50	.040	.040	.40/.60	.40/.60			.80	16.00	1.30	26.00
NE 9640	.38/.43	1.20/1.50	.040	.040	.40/.60	.40/.60			.80	16.00	1.30	26.00
NE 9642	.40/.45	1.30/1.60	.040	.040	.40/.60	.40/.60			.85	17.00	1.35	27.00
NE 9645	.43/.48	1.30/1.60	.040	.040	.40/.60	.40/.60			.85	17.00	1.35	27.00
NE 9650	.48/.53	1.30/1.60	.040	.040	.40/.60	.40/.60			.85	17.00	1.35	27.00

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over: Exceptions: 1 500 to 1499 lb. 2 400 to 1499 lb. 3 400 to 3999 lb. 4 450 to 1499 lb. 5 1000 to 1999 lb. 6 0 to 1999 lb. 7 300 to 10,000 lb. At Philadelphia galvanized sheets, 2500 more bundles; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; San Francisco, hot rolled sheets, 400 to 39,999 lb.; galvanized and cold rolled sheets, 750 to 4999 lb.; cold fin. bars, 0-299 lb.; hot rolled alloy bars, 0-4999 lb.; Seattle, cold finished bars, 1000 lb. and over, hot rolled alloy bars, 0-1999 lb.; Memphis, hot rolled sheets, 400 to 1999 lb., galvanized sheets, 150 and over; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, cold rolled sheets, 300 to 1999 lb.; galvanized sheets, 1 to 6 bundles; cold finished bars, 1 to 59 lbs.; SAE bars, 100 lb. Extras for size, quality, etc., apply on above quotations.

† Los Angeles, San Francisco and Seattle prices reflect special provisions of amendment No. 2 to OPA Price Schedule No. 49.

†† For zoned cities these grades have been revised to NE 8617-20.

* Base delivered prices according to price zones established by Amendment 14 to RPS 49 including the 3% transportation tax—not including the 6% freight increase of March 18, 1942, rescinded May 15, 1943.

† For zoned cities these grades have been revised to NE 9442-45 Ann'd.

*Recommended for large sections only. Note: The extras shown above are in addition to a base price of 2.70c. per 100 lb., on finished products and \$54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, \$5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

PRICES

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are \$2.25 higher; f.o.b. Duluth, billets only, \$2 higher. Delivered prices do not reflect new per cent tax on freight rates.

Per Gross Ton

Rerolling	\$34.00
Forging quality	40.00
Alloy Steel: Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton	\$54.00

Shell Steel

Per Gross Ton

3 in. to 12 in.	\$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00
Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.	
Prices delivered Detroit are \$2.25 higher.	

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton

Open hearth or bessemer	\$34.00
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Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.

Grooved, universal and sheared	1.90c.
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Wire Rods

(No. 5 to 9/32 in.)

Per Lb.

Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.53c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

Base per lb.

High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57 1/2c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi, 3c. higher.

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 202
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.90c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.90c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F. Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hotstrip	17.00c.	17.50c.	24.00c.	35.00c.
Cold st.	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.



A VALUABLE ALLY IN THE BATTLE OF PRODUCTION

WICACO INTERNAL GRINDERS, produced by a firm with a long record of successful Machine Tool construction, are particularly efficient in the continuous rush production of Bomb Sight Components, Aircraft Engine parts, Guns, Cartridge Dies, and many other units, resulting in increased production—fewer rejects.

Constructed with an underslung drive, vibration free and in constant tension—Rigid work head with oversize bearings—automatic reverse to speed up blind hole and shoulder work—Dynamic balance to all revolving parts—all of which spells PRECISION.

Deliveries can be made promptly under priority regulations, with electrical equipment ready to hook up and operate immediately. Write for complete descriptive matter.

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THE safe place for dust that ruins machinery, endangers health, and increases costs is in the bags of an American Dustube Dust Collector.

There is no escaping this highly efficient "trap". And that applies in all cases—even to the invisible "danger zone" dusts. In trapping these, the discharged air from a Dustube will show less than 10 million particles from 2 to 10 microns in size. Efficiency by weight is 98% and more.

In addition, you will find Dustubes to be the simplest and least costly of all high-efficiency collectors to install, operate, and maintain—and they don't have to be babied.

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510 S. Byrkit St., Mishawaka, Ind.



DUSTUBE
DUST COLLECTORS

PRICES

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

	Per Cent Off List
½ in. & smaller x 6 in. & shorter...	65½
9/16 & ¾ in. x 6 in. & shorter...	63½
¾ to 1 in. x 6 in. & shorter...	61
1¼ in. and larger, all length...	59
All diameters over 6 in. long...	59
Lag, all sizes...	62
Plow bolts...	65

Nuts, Cold Punched or Hot Pressed:

(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1¼ to 1½ in. inclusive	57
1½ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts

U.S.S. S.A.E.

7/16 in. and smaller	62	64
½ in. and smaller	62	64
¾ in. through 1 in.	59	60
9/16 to 1 in.	59	58
1¼ in. through 1½ in.	57	58
1½ in. and larger	56	58

In full container lots, 10 per cent additional discount.

Store Bolts

Packages, nuts loose 71 and 10
In packages, with nuts attached 71
In bulk 80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets

(¾ in. and larger)

Base per 100 lb.

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham \$3.75

Small Rivets

(7/16 in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham 65 and 5

Cap and Set Screws

Per Cent Off List

Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in. 64
Upset set screws, cup and oval points 71
Milled studs 46
Flat head cap screws, listed sizes... 38
Fillister head cap, listed sizes 51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb., gross ton \$40.00
Angle bars, 100 lb. 2.70
(F.o.b. Basing Points) Per Gross Ton
Light rails (from billets) \$40.00
Light rails (from rail steel) 39.00

Base per Lb.

Cut spikes 3.00c.
Screw spikes 5.15c.
Tie plates, steel 2.15c.
Tie plates, pacific Coast 2.30c.
Track bolts 4.75c.
Track bolts, heat treated, to railroads 5.00c.
Track bolts, jobbers discount 63-5

Basing Points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo: spikes alone—Youngstown, Lebanon, Pa., Richmond.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	\$6.00	\$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

PRICES

ELECTRICAL SHEETS

	(Base, f.o.b. Pittsburgh) Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham

	Base per Keg
Standard wire nails	\$2.55
Coated nails	2.55
Cutnails, carloads	3.85
	Base per 100 Lb.
Annealed fence wire	\$3.05
Annealed galvanized fence wire	3.40
	Base Column
Woven wire fence*	67
Fence posts (carloads)	€9
Single loop bale ties	59
Galvanized barbed wire†	70
Twisted barbed wire	70

*15 1/2 gage and heavier. †On \$0-rod spools in carload quantities.

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe) Base Price—\$200 per Net Ton

Steel (Butt Weld)

	Black	Galv.
1/2 in.	63 1/2	51
3/4 in.	66 1/2	55
1 to 3 in.	68 1/2	57 1/2

Wrought Iron (Butt Weld)

1/2 in.	25	3 1/2
3/4 in.	30	10
1 and 1 1/4 in.	34	16
1 1/2 in.	38	18 1/2
2 in.	37 1/2	18

Steel (Lap Weld)

2 in.	61	49 1/2
2 1/2 and 3 in.	64	52 1/2
3 1/2 to 6 in.	66	54 1/2

Wrought Iron (Lap Weld)

2 in.	30 1/2	12
2 1/2 to 3 1/2 in.	31 1/2	14 1/2
4 in.	33 1/2	18
4 1/2 to 8 in.	32 1/2	17

Steel (Butt, extra strong, plain ends)

	Black	Galv.
1/2 in.	61 1/2	50 1/2
3/4 in.	65 1/2	54 1/2
1 to 3 in.	67	57

Wrought Iron (Same as Above)

1/2 in.	25	6
3/4 in.	31	12
1 to 2 in.	38	19 1/2

Steel (Lap, extra strong, plain ends)

2 in.	59	48 1/2
2 1/2 and 3 in.	63	52 1/2
3 1/2 to 6 in.	66 1/2	56

Wrought Iron (Same as Above)

2 in.	33 1/2	15 1/2
2 1/2 to 4 in.	39	22 1/2
4 1/2 to 6 in.	37 1/2	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher on all butt weld.

NEW REEVES Reducer-Type TRANSMISSION



• Combines Variable Speed Mechanism and Gear Reducer In Single Compact Unit.

★ This new REEVES unit consists of the REEVES Variable Speed Transmission and built-in speed reducer. Provides accurate speed adjustability and speed reduction without use of other auxiliary speed reducing equipment. Compact, space-saving. In horizontal or vertical designs for mounting in any desired position. Each design offered in wide range of speeds and sizes from 1 to 7 1/2 h.p. inclusive. Transmission in various sizes provides ratios of speed change 2:1 through 12:1 and reducer provides ratios to and including 6.9:1. May be equipped for individual motor drive by use of REEVES motor base, adjustable to accommodate any standard make motor. Get full details of this efficient new REEVES drive. Write for Catalog ITR-432.

REEVES PULLEY CO., COLUMBUS, INDIANA

Reeves Speed Control

MIDDLE EAST SALVAGE: From this dump collected by salvage organizations in the Middle East throughout the various campaigns 3 1/2 tons of duralium are sent daily to Britain.



PRICES

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos- phorus	Charcoal
Boston††	\$25.00	\$24.50	\$26.00	\$26.50		
Brooklyn	27.50			28.00		
Jersey City	26.53	26.03	27.53	27.03		
Philadelphia	25.84	25.34	26.84	26.34	\$30.74	
Bethlehem, Pa.	25.00	24.50	26.00	25.50		
Everett, Mass.††	25.00	24.50	26.00	25.50		
Swedeland, Pa.	25.00	24.50	26.00	25.50		
Steelton, Pa.		24.50			29.00	
Birdsboro, Pa.	25.00	24.50	26.00	25.50	29.50	
Sparrows Point, Md.	25.00	24.50				
Erie, Pa.	24.00	23.50	25.00	24.50		
Neville Island, Pa.	24.00	23.50	24.50	24.00		
Sharpsville, Pa.*	24.00	23.50	24.50	24.00		
Buffalo	24.00	23.00	25.00	24.50	29.50	
Cincinnati, Ohio	23.94	23.94		25.11		
Canton, Ohio	25.39	24.89	25.89	25.39	32.69	
Mansfield, Ohio	25.94	25.44	26.44	25.94	32.66	
St. Louis	24.50	24.50				
Chicago	24.00	23.50	24.50	24.00	35.46	\$31.34
Granite City, Ill.	24.00	23.50	24.50	24.00		
Cleveland	24.00	23.50	24.50	24.00	22.42	
Hamilton, Ohio	24.00	23.50		24.00		
Toledo	24.00	23.50	24.50	24.00		
Youngstown*	24.00	23.50	24.50	24.00	22.42	
Detroit	24.00	23.50	24.50	24.00		
Lake Superior fc.					\$28.00	
Lyles, Tenn. fc.†					33.00	
St. Paul	26.76		27.26	26.76	39.80	
Duluth	24.50	24.00	25.00	24.50		
Birmingham	20.38	19.00	25.00			
Los Angeles	26.95					
San Francisco	26.95					
Seattle	26.95					
Provo, Utah	22.00	21.50				
Montreal	27.50	27.50		28.00		
Toronto	25.50	25.50		26.00		

GRAY FORGE IRON: Valley or Pittsburgh furnace\$23.50

*Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

**Pittsburgh Ferromanganese Co. (Chester furnace only) may charge \$2.21 a ton over maximum basing point prices.

†Price shown is for low-phosphorus iron; high-phosphorus sells for \$28.50 at the furnace.

††Eastern Gas & Fuel Associates, Boston, is permitted to sell pig iron produced by its selling company, Mystic Iron Works, Everett, Mass., at \$1 per gross ton above maximum prices.

Delta Chemical & Iron Co., Chicago, may charge \$30 for charcoal iron at its Delta, Mich., furnace.

Basing point prices are subject to switching charges; silicon differential (not to exceed 50c. a ton for each 0.1 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorus differentials, a reduction of 38c. per ton for phosphorus content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, \$2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and \$1 per ton extra for each additional 0.25 per cent nickel.

Powdered Metals

Prices are based on current market prices of ingots plus a fixed figure. For ton lots f.o.b. shipping point, in cents per lb.

Copper, electrolytic, 150 and 200 mesh	21 1/4 to 23 1/4c.
Copper, reduced, 150 and 200 mesh	20 1/2 to 25 1/4c.
Iron, commercial, 100 and 200 mesh	13 1/2 to 15c.
Iron, crushed, 200 mesh and finer.	4c.
Iron, hydrogen reduced, 300 mesh and finer	30c.
Iron, electrolytic, unannealed, coarser than 300 mesh	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh	42c.
Iron, carbonyl, 300 mesh and finer	90c.
Aluminum, 100 and 200 mesh.	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	\$1
Chromium, 150 mesh	\$1.03
Lead, 100, 200 & 300 mesh, 11 1/2 to 12 1/2c.	
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51 1/2c.
Solder powder, 100 mesh, 8 1/2c. plus metal	
Tin, 100 mesh	58 3/4c.

*Freight allowed east of Mississippi.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless	Lap Weld
	Cold Drawn	Hot Rolled
2 in. o.d. 13 B.W.G.	15.03	13.04
2 1/2 in. o.d. 12 B.W.G.	20.21	17.54
3 in. o.d. 12 B.W.G.	22.48	19.50
3 1/2 in. o.d. 11 B.W.G.	28.37	24.62
4 in. o.d. 10 B.W.G.	35.20	30.54
(Extras for less carload quantities)		
40,000 lb. or ft., and over	Base	
30,000 lb. or ft. to 39,999 lb. or ft.	5%	
20,000 lb. or ft. to 29,999 lb. or ft.	10%	
10,000 lb. or ft. to 19,999 lb. or ft.	20%	
5,000 lb. or ft. to 9,999 lb. or ft.	30%	
2,000 lb. or ft. to 4,999 lb. or ft.	45%	
Under 2,000 lb. or ft.	65%	

CUTS the
Toughest Steels
and Largest
Sizes easily

This giant hydraulic metal-cutting saw is more than just a larger hack saw. It is a new development in metal-cutting methods that introduces a new principle of metal sawing — the Roll-stroke blade action makes it possible to cut the toughest steels in the largest sizes easily and rapidly. It also permits a simple and efficient, very low pressure Hydraulic Feed System.

Write for
Catalog



MARVEL No. 18

Giant Hydraulic
Hack Saw

Capacity 18"x18"

Cuts angles up to 45°
by simply swiveling up-
per machine housing.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"
5700 Bloomingdale Ave., Chicago 30, U. S. A.

Eastern Sales Office
225 Lafayette St.,
New York

PRICES

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago.....	\$54.80
6-in. and larger, del'd New York....	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles.....	69.40
6-in. and larger f.o.b. cars, Seattle.	71.20

Class "A" and gas pipe, \$3 extra; 4-in. pipe is \$3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is \$45 at Birmingham and \$53.80 delivered Chicago, \$59.40 at San Francisco and Los Angeles, and \$70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports*)

	Per Gross Ton
Old range, bessemer, 51.50	\$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorous, 51.50	4.35

*Adjustments are made to indicated prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

COKE

Furnace

	Per Net Ton
†Connellsville, prompt	\$6.50*

Foundry

†Connellsville, prompt	\$7.50
Fayette County, W. Va. (Beehive) ..	\$8.10
By-product, Chicago	\$12.25
By-product, New England	\$13.75
By-product, Newark	\$12.40 to \$12.95
By-product, Philadelphia	\$12.38
By-product, Cleveland	\$12.30
By-product, Cincinnati	\$11.75
By-product, Birmingham	\$8.50†
By-product, St. Louis	\$12.02
By-product, Buffalo	\$12.50

Maximum by-product coke prices established by OPA became effective Oct. 1, 1941.

*Hand-drawn ovens using trucked coal are permitted to charge \$7.00 per net ton, plus usual transportation. Maximum beehive furnace coke prices established by OPA, Feb. 8, 1942. †F.o.b. oven.

FLUORSPAR

	Per Net Ton
Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail	\$25.00
Domestic, f.o.b. Ohio River landing barges	25.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines	25.00

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Per 1000
Super-duty brick, St. Louis	\$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60

Silica Brick

Pennsylvania & Birmingham	\$51.30
Chicago District	58.90
Silica cement, net ton (Eastern) ..	9.00

Chrome Brick

	Per Net Ton
Standard, chemically bonded, Balt., Plymouth Meeting, Chester	\$54.00

Magnesite Brick

Standard, Balt. and Chester	\$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks (carloads)	\$44.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

Symbol OF INTEGRITY



100% Devoted
to War Production

PLATE & WELDING
DIVISION

PLANT AT SHARON, PA.

Plate and Welding Division

GENERAL AMERICAN TRANSPORTATION CORPORATION
SHARON, PA.

PERFORATED
METALS

INDUSTRIAL and
ORNAMENTAL

To produce the highest quality of perforated metal as used in the industrial arts and for ornamentation has been the ambition and persistent endeavor of this company. The highest quality best serves the user. We are here to serve you.

ANY METAL • ANY PERFORATION

The
Harrington & King
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LEE

Quality Springs

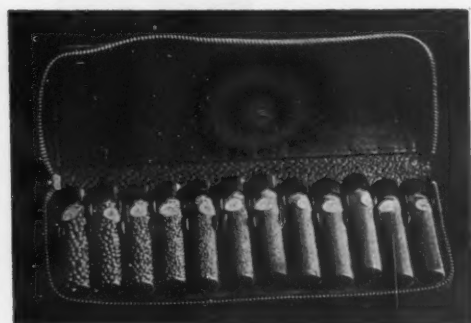
ALL SHAPES · ALL SIZES · ALL MATERIALS



LEE SPRING COMPANY, Inc.

30 MAIN STREET BROOKLYN, N.Y.





HEAT-TREATED STEEL SHOT

**We manufacture
shot and grit for
endurance**

A shot or grit that will blast fast with a clean finish.

This is the only reason why so many operators are daily changing to our shot and grit, from Maine to California.

The unprecedented demand for our—

Heat-Treated Steel Shot and Heat-Treated Steel Grit

has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.

**HARRISON
ABRASIVE
CORPORATION**
Manchester, New Hampshire

HEAT-TREATED STEEL GRIT



FERROALLOY

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans, duty paid, 80%, per gross ton (carloads)\$135.00
Delivered Pittsburgh\$140.33
F.o.b. Southern furnaces\$135.00

For packed carloads, add \$6 per gross ton; \$10 for ton; \$13.50 for less than a ton; \$18 for less than 200 lb.

Electrolytic Manganese

99.9 $\frac{1}{4}$ + %, less ton lots, per lb. 42c.
Ton lots 40c.
Annual contracts 38c.

Spiegeleisen

(Carlots, per gross ton, Palmerton, Pa.)
Domestic, 19 to 21%\$36.00
Domestic, 26 to 29% 49.50

Electric Ferrosilicon

(Per Gross Ton, Delivered Lump Size)
50% (carload lots, bulk)\$74.50
50% (ton lots, packed) 87.00
75% (carload lots, bulk)135.00
75% (ton lots, packed)151.00

Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 Si)
F.o.b. Jackson, Ohio\$29.50*
Buffalo 30.75*
For each additional 0.50% silicon add \$1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add \$1 a ton for 0.75% phosphorus or over.
*Official OPA price established June 24, 1941.

Bessemer Ferrosilicon

Prices are \$1 a ton above Silvery Iron quotations of comparable analysis.

Ferrochrome

(66% to 72%, delivered lump size, on contract, per lb. contained Cr)

	Carlots	Ton Lots
4 to 6 carbon	13.00c.	13.75c.
2 carbon	19.50c.	20.25c.
1 carbon	20.50c.	21.25c.
0.10 carbon	22.50c.	23.25c.
0.06 carbon	23.00c.	23.75c.

Spot prices are $\frac{1}{4}$ c. per lb. of contained chromium higher.

Silicon Metal

Contract basis, f.o.b. producer's plant, freight allowed, 1 per cent
iron, carlots, per lb.14.50c.
Less-ton lots15.25c.
2% iron, carlots13.00c.
Less-ton lots13.75c.

Silicon Briquets

Contract basis, carlots, bulk freight allowed, per ton.....\$74.50
Packed\$80.50
Ton lots\$84.50

Silicomanganese

(Per gross ton, delivered, carloads, bulk)
3.00 carbon\$120.00*
2.50 carbon 125.00*
2.00 carbon 130.00*
1.00 carbon 140.00*

Briquets, contract, basis carlots, bulk freight allowed, per lb. ... 5.80c.†
Packed 6.05c.†
Less-ton lots 6.55c.†

*Spot prices are \$5 per ton higher.
†Spot prices $\frac{1}{4}$ c. higher.

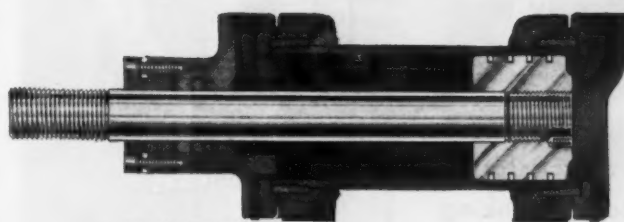
PRICES

Other Ferroalloys

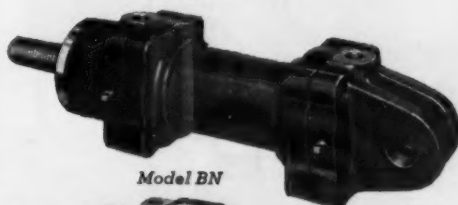
Ferrotungsten, delivered, carlots, per lb. contained tungsten . . .	\$1.90
Tungsten metal powder, 98%-99%, any quantity, per lb. . . .	\$2.60
Ferrovandium, 35%-40%, contract basis, f.o.b. producers plant, usual freight allowances, open-hearth grade, per lb. contained vanadium	\$2.70
Special grade	\$2.80
Very special grade	\$2.90
Vanadium pentoxide, 88%-92% V ₂ O ₅ technical grade, contract basis, any quantity, per lb. contained V ₂ O ₅	\$1.10
Ferroboreon, contract basis, 17.50% boron minimum, f.o.b. Niagara Falls, carlots, per lb. alloy	\$1.20
Ton lots	\$1.25
Silvaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy	23c.
Silvaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy	40c.
Grainal, f.o.b. Bridgeville, Pa., freight allowed 100 lb. and over, maximum based on rate to St. Louis, per lb.	45c.
Bortam, f.o.b. Niagara Falls	45c.
Ton lots, per lb.	50c.
Borosil, 3% to 4% boron, 40 to 45% silicon, f.o.b. Philo, Ohio, per pound contained boron	\$7.00
Ferrocolumbium, 50% to 60%, f.o.b. Niagara Falls, ton lots, per lb. contained columbium . . .	\$2.25
Less-ton lots	\$2.30
Ferrotitanium, 40%-45%, f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained titanium	\$1.23
Less-ton lots	\$1.25
Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium	\$1.35
Less-ton lots	\$1.40
High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore & St. Louis, per gross ton .	\$142.50
3%-5% carbon	\$157.50
Ferrophosphorus, 18% electric or blast furnace, f.o.b. Anniston, Ala. carlots, with \$3 unitage freight equalized with Rockdale, Tenn., per gross ton	\$58.50
Ferrophosphorus, electrolytic 23-25%, carlots, f.o.b. Monsanto (Siglo), Tenn., \$3 unitage freight equalized with Nashville, per gross ton	\$75.00
Ferromolybdenum, 55-75 per cent, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	95c.
Calcium molybdate, 40%-45%, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	80c.
Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo	80c.
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo	80c.
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb. Under 100 lb.	\$2.60
Zirconium, 35-40%, contract basis, carloads in bulk or package, per lb. of alloy	15c.
Less-ton lots	16c.
Zirconium, 12-15%, contract basis, carlots, bulk, per gross ton .	\$102.50
Packed	\$107.50
Less-ton lots	\$112.50
Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, per lb. . . .	7.50c.
Ton lots	8c.
Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, carlots, freight allowed, per lb. .	10.50c.
Less-ton lots	11c.

Better Hydraulic

Power . . .



Sectional View



Model BN



Model EN

Other Mountings Available

● Hannifin patented high pressure hydraulic cylinders provide stronger, simpler construction, easier application, and high efficiency use of hydraulic power. Mirror finish honing produces a cylinder bore that is straight, round, perfectly finished for efficient piston seal with minimum fluid slip. No-tie-rod design and universal end caps which may be positioned independently provide for simplest installation and convenient piping.

Built in seven standard mounting types, with small piston rod, 2 to 1 differential piston rod, or double end rod, in all sizes. Furnished with or without cushion. Many special types available, any size, for any pressure. Write for Bulletin 35-A.

HANNIFIN MANUFACTURING COMPANY
521-631 S. Kolmar Avenue, Chicago, Illinois

HANNIFIN HYDRAULIC CYLINDERS

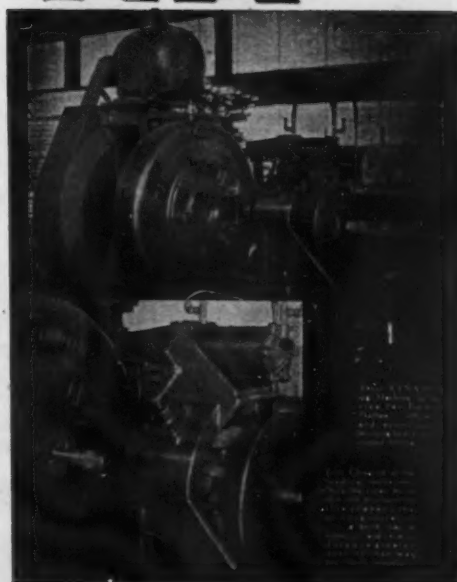
LEWIN-MATHES *Got the right answer at*

ETNA

They had a job of pointing heavy-walled copper tubing, and wanted to speed up the operation. Just how to do it didn't appear on the horizon, and so Lewin-Mathes did the safe and logical thing—they put their swaging job up to Etna.

The answer to that problem is illustrated on this page. It's a modern Etna Swaging Machine that points more copper tubes per hour in less time at less cost. If you have a problem involving tapering or reducing tubing and solid rounds—ask Etna about it.

Etna has the swaging machines from 3/8" to 4" and the experience to help you get the most out of this type of machine.



IF IT'S A QUESTION OF TAPERING, SIZING OR REDUCING OF ROUND SOLIDS OR TUBING...

Ask **ETNA**
About Swaging

ETNA

MACHINE COMPANY

TOLEDO OHIO

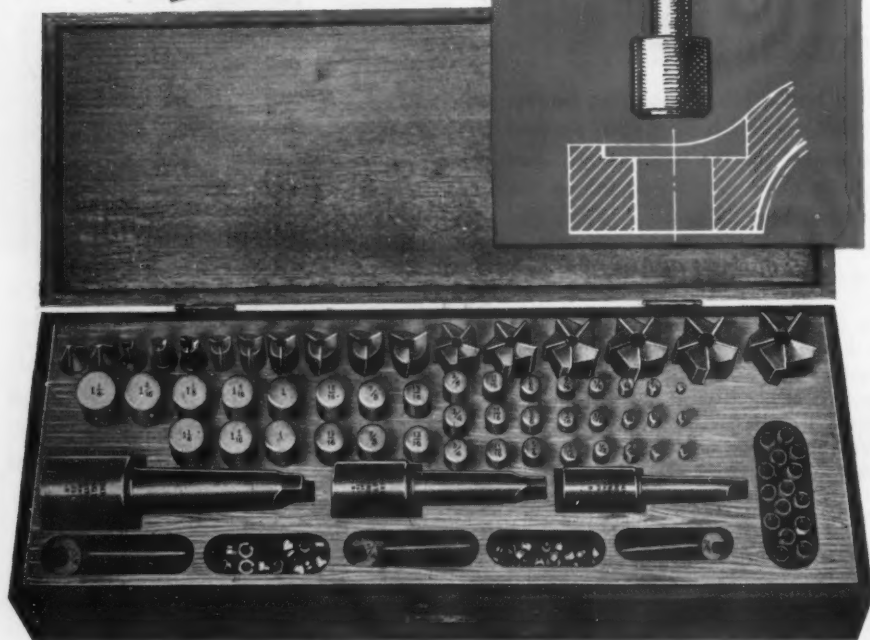
Today's production program demands accurate, efficient cutting tools within easy reach. Gairing standard kits (particularly recommended for tool rooms, machine, die and repair shops) provide the answer for all counterboring, countersinking and spot-facing operations.

There are seven sets from which to choose. Set B-4 is illustrated here. Each contains tools designed with special features to meet different requirements — each is a logical assortment of interchangeable counterbores, pilots and holders neatly boxed in sturdy wooden cases with stout hinged covers.

FIRST AID FOR THE TOOL ROOM

Write us today for our four-page Counterbore Bulletin illustrating, describing and pricing all seven sets.

**Gairing
TOOLS**



Gairing Interchangeable Counterbore Set No. B-4

THE GAIRING TOOL COMPANY, Detroit, Michigan

Manufacturers of Standard, Special and Gair-Lock Inserted Blade Cutting Tools

The interchangeable holders in these sets are of Morse Taper or straight shank type. (Optional.) Threaded shank pilots are of selected alloy steel hardened and ground on the head. Shanks are drawn and treated to obtain unusual toughness and strength. High speed steel counterbores are renewable. The use of these interchangeable assemblies assures large savings over the old fashioned solid integral pilot type.

All counterbores, pilots and holders selected are standard items of the most active sizes used. Replacements may be quickly obtained from stock.

GAIRING
FOR OVER A
QUARTER CENTURY
SPECIALISTS
IN FINE
CUTTING TOOLS